



FRIDAY, FEBRUARY 9, 1900.

## CONTENTS.

ILLUSTRATIONS:	PAGE	EDITORIAL NOTES:	PAGE
Ventilating Passenger Cars on the Pennsylvania.....	82	New Publications.....	89
American Practice in Block Signaling.—Part III.....	83	Trade Catalogues.....	89
Travelling False Work for Short Bridges.....	84	GENERAL NEWS:	
Sabine's Automatic Car Coupler.....	84	Locomotive Building.....	92
The Simonton Gear for Hopper Bottom Cars.....	85	Car Building.....	92
Electro-Pneumatic Interlocking at the Boston Southern Station—Continued.....	86	Bridge Building.....	93
		Meetings and Announcements.....	94
		Personal.....	94
		Elections and Appointments.....	95
		Railroad Construction.....	95
		General Railroad News.....	96
CONTRIBUTIONS:		MISCELLANEOUS:	
Life of Ties.....	81	Technical.....	90
Automatic Couplers.....	81	The Scrap Heap.....	91
The Economical Speed of Freight Trains.....	81	Counterbalancing Locomotives.....	94
Wood Preserving in Germany.....	81	The Law of Union Stations in Florida.....	85
		The Actual Condition of the Panama Canal.....	85
EDITORIALS:		The Claims of the Interstate Commerce Commission.....	90
2½ Cents per Bushel, Buffalo to New York.....	88		
The Railroad Spiral.....	88		

## Contributions.

## Life of Ties.

Michigan Tie Company. }  
Hillsdale, Mich., Jan. 25, 1900. }

To the Editor of the Railroad Gazette:

Can any of the readers of the Gazette furnish us with statistics regarding the average life of cherry, rock elm, red elm, white and black walnut ties?

C. A. FRENCH, Treasurer.

## Automatic Couplers.

Washington, D. C., Jan. 31st.

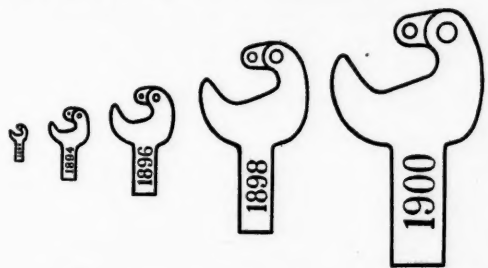
To the Editor of the Railroad Gazette:

The following statement as to the use of automatic couplers on the railroads of the United States is submitted:

Year.	Total number of cars in freight service, (excluding private).	Total number of cars equipped with automatic couplers.	Per Cent.
June 30, 1892.....	966,988	155,117	16
June 30, 1894.....	1,205,169	317,896	26
June 30, 1896.....	1,321,887	500,233	41
June 30, 1898.....	1,348,826	851,533	69
January, 1900.....	1,292,735	1,176,599	91

In the above comparison it is the intention to convey to the public as accurately as possible the progress made by the railroad companies of the United States in replacing the old link and pin by the modern and up-to-date automatic coupler.

Prior to the passage by Congress of the "Safety Appliance Act" of March, 1893, requiring the railroads to equip their cars with safety couplers, 16



per cent. were already equipped, while the statistics shows that in January, 1900, 91 per cent. were equipped, or an average yearly increase of about 10 per cent. Comparing this with the average of 4 per cent. yearly increase in cars added since 1892, the figures evidence rapid progress on part of the railroads in complying with the "Safety Appliance Act."

H. G. M.

## The Economical Speed of Freight Trains.

Chicago, Burlington & Quincy Railroad }  
Company, Chicago, Jan. 30, 1900. }

To the Editor of the Railroad Gazette:

I am much interested in what Prof. Raymond has written, but I doubt if I can add anything to the matter, and am too much pressed now with other work to attempt it. The explanation of the first cause in my paper was evidently misunderstood by a number of those who have commented upon it. While I stated that the increased train resistance would account for a fuel consumption, 62½ per cent. greater at 60 miles an hour than at 30, I went on to say that there was a further loss due to lack of efficiency of the engine. I think a better way to state the case is to say that the extra expense of operating a train, whether freight or passenger, at speed arises, so far as the cost of fuel is concerned, from the following causes:

First, the train resistance, which increases by a definite formula.

Second, the diminished efficiency of the steam in the cylinder due to wire drawing the steam actually furnished by the boiler.

Third, the fact that the calorific value of the coal is largely lost at high speed, by an amount which varies with the design of the engine, but which in any case is considerable, for the reason that the gases pass through the flues more rapidly and that the coal is burned on the grate at a rate much too rapid for perfect combustion.

Fourth, at 60 miles an hour, and assuming the same quantity of steam taken at each stroke, we call on our boiler for twice as much steam per unit of time as at 30 miles per hour.

F. A. DELANO.

[It will be remembered that Mr. Delano's paper discussed passenger train speeds only. Many of the considerations apply also to the more important question of freight train speeds.—Editor.]

Chicago & Northwestern Railway Co. }  
Chicago, Jan. 30, 1900. }

To the Editor of the Railroad Gazette:

In the first portion of Mr. Raymond's article he states that the tractive force of a locomotive capable of developing a constant horse power will be inversely as the speed. We think there is a point here which Professor Raymond has overlooked, and that is, the fact, that as the speed is increased, for a given rate of evaporation by the boiler, it is necessary, of course, to cut off earlier, and when this earlier cut-off is brought about it naturally affects a more economical use of steam. For example: A cut-off of 25 per cent at 300 revolutions per minute will give 60 per cent. more work per pound of steam than does a cut-off of 75 per cent. at 100 revolutions per minute. Apparently, the work done should be the same in both cases per pound of steam, but from the fact that we get the benefits of expansion at the earlier cut-off, this really gives us an increase in the available horse power of the boiler at the higher speed, which, of course (as above explained), is due to the more economical use of steam at the early cut-off. This will modify somewhat the table showing the different speeds at which a locomotive could run on various grades that would just make 10 miles an hour on a 1 per cent. grade with the train under consideration. The figures on this basis would come out about as follows:

Speed, miles per hour.....	10	15	20	25	30	35	40
Per cent. of grade.....	1	.7	.5	.3	.1	— .05	— .15

Of course, as Professor Raymond says, these values will depend somewhat on the design of the engine, but the relation should hold to the assumption pretty nearly for the majority of locomotives.

In the June issue (1899) of the American Engineer and Railroad Journal, the undersigned gave some curves showing the cost of operating freight trains at different speeds on different grades. The limits of these curves showed the maximum load which the engine under consideration could haul at different speeds. The remarks of Professor Raymond refer to the fact that little was to be gained by decreasing the speed below 10 miles an hour. These curves showed that by reducing the load from 413 tons to 400 tons on a 2 per cent. grade, the speed could be increased from 5 to 10 miles an hour, which, of course, is a very small reduction in load to gain a large increase in speed, and is certainly well worth doing to obtain the most economical results.

There is no doubt but that the statement that each division and each class of locomotive would have a different economical freight train speed, and that this would vary with the conditions from one end of the line to the other, is correct, and in the article in question would seem to indicate that at grades of about 2 per cent., 10 miles an hour was the most economical speed; but of course it must be remembered that this only applied to the conditions of fuel, cost of labor, supplies, etc., which existed under the supposition under which the diagrams were worked up. Any variation in one or more of these items would, of course, demand a reconstruction of the curves.

The last portion of Professor Raymond's remarks in regard to the "light ruling grade" road being considered superior to the heavy rival, is illustrated by the diagram in the American Engineer, above referred to.

Suppose, for instance, two divisions, each 100 miles in length, and each having a total rise of 5,280 ft. in this length; one division, however, consisting of a uniform 1 per cent. grade from the start to the finish, and the other one consisting of 50 miles of level and then 50 miles of a 2 per cent. grade. The total rise and length of travel is the same in each case, but it will be seen that while the cost per trip-ton (that is, each ton hauled over the entire division) is 6 cents for the 1 per cent. grade, the combination level and 2 per cent. grade will be operated at a cost of 6½ cents per trip-ton.

In regard to the question of speed on the same division, we find that the most economical speed

for the first case will be at 10 miles an hour for the whole trip, or 10 hours in passing over the division.

In the second case, however, 10 miles an hour will be the most economical speed on the heavy grade, but in accordance with Professor Raymond's table, we could run 25 miles on the level with the same weight of train. This would require, therefore, a total time of seven hours to get over the 100 miles, and reach the summit, or an average of 14 miles an hour. For the first division, were we to attempt to run the 1 per cent. grade at a speed of 14 miles an hour, it would have to be done at a cost of 6½ cents per trip-ton.

In regard to the speed which gives the greatest hauling power, not necessarily being the most economical, this was demonstrated on a certain mountain division, where a locomotive could haul 650 tons at a speed of 5 miles an hour, but when this load was reduced to 610 tons the same engine was enabled to haul the train at a speed of 10 miles an hour. This, according to the diagram, would give an economy of operation of 11½ cents per 100 ton-miles, against 14 cents in running with the heavier train and at the same speed.

The whole matter of economical freight train speeds is one of great interest, and articles like the one from Professor Raymond will help to bring this matter in the proper light before those interested, and will bring about a much more intelligent conduct of this interesting and important question.

G. R. HENDERSON.

## Wood Preserving in Germany.

New York, Jan. 26, 1900.

To the Editor of the Railroad Gazette:

In your issue of January 12 there appears an article on "The Use of Beech Cross Ties in Germany." The article is all right as far as it goes—but it doesn't go far enough, and it speaks of conditions as they existed some years ago.

Great progress has been made in the past few years in wood impregnation, none of the methods hitherto employed having filled the bill. The processes chiefly in use during the past 50 or 60 years—kyanizing, Burnettizing and creosoting—or combinations and variations of these, each possessed some good feature, but all had many faults. These faults from many years of experience were well known, and careful study made to overcome them.

The most serious difficulty to master was to thoroughly and evenly penetrate the wood with the preservative agent, and then to keep it there. The slight penetration obtained by processes formerly in use preserved only a thin outer skin. If this skin was damaged or broken by driving a spike or otherwise, it exposed the interior or untreated portion to moisture, etc., while again preventing its drying out quickly, and consequent rapid decay, as is the case with creosote, Wellhouse, etc. Such timber for bridge work or piling is dangerous.

In the Burnettizing process the preservative agent, chloride of zinc, is usually only mechanically deposited in the cells and sap ducts, being deposited there in the shape of crystals from a water solution. These crystals still remain soluble in water and so are again as readily leached out by the action of rain or water, leaving the wood unprotected. Many examinations of ties thus treated in Germany show that after a few years no traces of zinc are found in the wood. These are the two greatest faults of the processes that had heretofore given the best satisfaction.

Some 24 years ago a German engineer, Mr. Fritz Hasselmann, undertook to solve this problem, and from all indications and experiences he has successfully done so. The result of his many years of study, experimenting and investigations is a process, patented in all countries, which consists in boiling the wood in a solution of metallic and mineral salts under limited pressure. The impregnating liquid consists of a solution of the sulphates of copper and iron (crystallized together in the proportion of 20 per cent. of copper to 80 per cent. of iron) and alumina, and "kainit," a salt mined at Stassfurt, Germany, consisting chiefly of sulphate of potassa and magnesia and the chloride of magnesia.

The proportion of these salts used, the temperature to which the liquid is raised, the time of boiling, as well as the pressure generated, vary with the character, age, nature and general condition of the wood to be treated. It is a well-known and conceded fact that the salts of iron and copper will preserve wood providing they can be thoroughly and evenly distributed throughout and can be kept there.

Both of these conditions are fulfilled by this process. The sap is dissolved and carried off in the liquid; the copper destroys any fungi (or germs of decay) that may be present in the wood, while the iron forms a chemical combination with the cellulose or woody fiber, which is insoluble in water. The salts are not mechanically deposited by the evaporation of the suspending liquid, leaving them behind in the shape of crystals to fill up the cells and sap ducts, there to decompose and lose their antiseptic properties, or have a tendency to make the wood brittle, nor do they remain in a soluble state so that action of water or rains will again extract them.



A microscopical examination of wood treated by this process shows the cells and sap ducts to be perfectly free (other than the resinous matter which has been converted and is seen as a thin brown coating on the sides of the cell tissues) and not choked up with crystals. The thorough permeation and presence of the salts of iron can be readily demonstrated by simple and well-known chemical tests, which any person can employ, and do not require the assistance of an expert chemist.

I quote from an article written by Professor Dr. J. E. Weiss, who has devoted many years to a thorough study of the Hasselmann and other processes, and who is considered one of, if not the highest authority on woods and wood preservation throughout Europe:

"In all systems of wood impregnation used to date . . . the preservative agents were merely mechanically deposited in the cells and sap ducts, penetrating to a slight degree the woody fiber, but as they underwent no chemical change, remaining in an easily soluble condition, they were again readily leached out on exposing to the action of water. By the Hasselmann process a chemical combination of the preserving ingredients with the woody fiber and cell contents is effected. . . . Numerous experiments and trials have convinced me that a simple boiling of the wood in the impregnating liquid will not suffice. The thorough impregnation by the Hasselmann system can only be attained with positiveness by boiling the preserving liquid at a temperature of 100° to 140° C. and under a pressure of 15 to 45 lbs., varying with the nature of the wood to be treated.

"That wood so treated is actually chemically preserved is further proven by the following facts: Were the impregnation merely a mechanical one (deposit of crystals in cells), then it would be possible to again dissolve and extract the introduced preservative agents by boiling the treated wood in water. A two hours' boiling of samples of wood treated by the Hasselmann system proved that the preserving chemicals could not be dissolved and extracted, and that the wood retained all of its properties and characteristics. Some slight traces of the chemicals may be found in the water in which the treated wood has been boiled, but that is to be expected when one considers that at the moment of releasing the pressure after boiling the timber as prescribed by Hasselmann the cells and pores of the wood are filled with the preserving liquor, which can then no longer chemically combine with the fibre or tissue of the wood. The liquor contained in these cells, consisting of a solution of the preservative agents, can naturally be partly extracted by again boiling in water.

"These conditions furnish convincing proof that by none of the methods now or formerly in use has a chemical impregnation been possible, and it stands to reason that the Hasselmann system of impregnation is the only reliable one, as each step is based on well-known scientific laws and principles.

"Now let us carefully examine timber treated by the Hasselmann system and compare results with the requirements, and we arrive at the following deductions:

"(1) The most important requisite is that it should be proof against decay, mildew or fungus growths. That this is accomplished is proved by the report of tests made at the Royal Experimental Station at Klosterneuburg.

"(2) Wood thus treated retains all of its characteristic properties that make it a valuable commodity, particularly its elasticity.

"(3) After treatment it becomes considerably harder without any perceptible increase in weight.

"(4) Its inflammability is greatly lessened.

"(5) Its susceptibility to taking an extremely high polish is astonishing."

The Hasselmann process has been adopted by several German Government Railroads (notably the Bavarian) and many private corporations either for their own use or for general wood preserving work.

In 1896 the Bavarian Government ordered the necessary changes to be made at their impregnating plant at Kirchseon, near Munich, where they had been working with creosote (dead oil of tar) chloride of zinc and bichloride of mercury for the past 50 years or more, to adopt the Hasselmann system of impregnation. So satisfactory have been the results attained that they have just ordered a new combination cylinder and boiler (patented by the superintendent of the plant) in order to increase the annual output.

The adoption of the system was primarily due to the good results attained in the treatment of beech.

. . . The Hasselmann impregnation permits the use of beech, which to-day is about the only wood of any quantity still left in Germany. Of a million or more ties treated at this plant in the past few years by this process, the largest percentage consisted of beech and have given thorough satisfaction.

Your article states: "The conclusions of Mr. Schneidt were that chloride of zinc is not effective, and that creosote is the only agent to be considered as a material for the preservation of beech; and further, that of the various processes only that one is to be considered in which the timber is treated with hot oil of tar." This evidently is an error, as the excellent results obtained by use of the Hasselmann process against all others, shows that oil of tar is not the only process to be considered. Again, you write: "It is a common observation that the ties rot inside, leaving a deceptive shell of sound wood." Is not that the case with all kinds of wood treated by any of the processes hitherto used, and due, as we claim, to the preserving of an outer

shell only, owing to the inability to thoroughly penetrate and permeate the body of the wood?

With the Hasselmann system it is not as you state, "a necessary first condition to successful treatment to exclude wood that has begun to decay." The beech ties treated are not selected, because, as your article correctly states, the percentage of really sound beech is so small that to select would make the wood too expensive for use as ties. Any and all wood is equally successfully treated and protected against decay. Even such ties that had been in use for many years and shown indications of decay, were treated by this system and further decay arrested, the ties again becoming tough and hard after treatment, and good for many more years of service.

Still another great advantage of this process is the possibility of treating green or freshly cut timber, thereby doing away with the expense of a preliminary seasoning or drying of the wood. In fact, the greener the wood the more readily can we treat it, as the sap is more easily extracted, while the fiber and tissues are more readily penetrated before being covered by the resinous and other oxidized cell contents, which must then again be softened to extract them. Green wood requires but half the time for thorough penetration that is necessary for a seasoned wood. This possibility solved one of the great problems to make beech valuable, as, after our treatment, the checking or splitting is prevented.

A further peculiarity of our treatment is that the wood (particularly coniferous woods) becomes much harder and tougher without impairing any of its valuable properties, such as elasticity, pliability, tensile strength, etc. I quote from a report by Mr. Jos. Bleibinhaus, Royal Eng. M. W. and Supt. of the Impregnating plant of the Royal Bavarian Government:

"The property of increasing the hardness makes the Hasselmann process especially valuable for the treatment of soft woods, particularly if they are to be used for purposes requiring them to withstand enormous pressures, as is the case with railroad ties. This new method of impregnation is of the most vital importance for the treatment of ties, as, thanks to it, all of the coniferous or soft woods can now be utilized for that purpose. . . . Ties of soft woods hardened by impregnation as prescribed by the Hasselmann system are in all respects equal to oak. The demand for oak is even now greater than the supply, and its cost fully 50 per cent. higher than that of the impregnated softer woods.

"The elasticity of the wood is not in the slightest degree impaired by this new treatment. . . . as has been demonstrated at the mechanical-technical laboratory of our technical high school by numerous tests and experiments." The possibility of treating green wood is particularly advantageous in the case of beech. It is well known that beech, soon after cutting, will check, rip and split. It will not do so after impregnation by the Hasselmann process, and should, therefore, be treated as soon after cutting as possible to save it.

In conclusion, permit me to quote a few extracts from a lecture by Dr. Max Krause, M. E., C. E., of Berlin, held at the Seventh Annual Convention of German Mining Engineers at Munich, March 7, 1898.

"The mining industry in Germany consumes an amount of timber annually representing many millions of marks. Wood impregnated by the processes hitherto in use does not resist decay for a period longer than four or five years, and seldom even that long. If we carefully watch and examine our timbers we will find marked deterioration and decomposition after less than two years of usage in most of them, which sticks should, therefore, have been replaced even before this short lapse of time. . . ."

Here follows a short description of the three principal methods in use—Kyanizing, Burnettizing and Creosoting. After a description of the Burnett or zinc chloride process he states: "Oak, pine, fir, etc., cannot be thoroughly impregnated by this process at all; the chloride of zinc solution penetrates oak to a depth of hardly 2 cm., while in other woods it penetrates only the sap wood but not the heart wood at all. Beech, which absorbs the zinc solution more readily, but from which it is also as readily again leached out, must be most carefully selected for use, as it has hitherto not been possible to penetrate the so-called gray or red heart of the beech, because it would not absorb any of the impregnating liquids in use up to date. . . ."

"A third process extensively used throughout Germany for treating timber and railroad ties consists in saturating with creosote or dead oil of tar. As this treatment also is purely mechanical, the impregnation is not thorough, cannot be made to penetrate the red heart of the beech, nor does it impart any degree of hardness to wood. . . . We must also take into consideration its increased inflammability, a fault which forbids the use of such treated wood in mines. . . ."

"The three most generally adopted methods of impregnation, as we have seen, do not give very satisfactory results, and have not solved the problem of wood preservation. It therefore fills us with delight and pleasure to learn that a process has recently been invented which sought the solution of this problem in a hitherto unexplored direction, and from all indications accomplishes its purpose most thoroughly and completely. While all have striven to fill up the cells and sap ducts of the wood with more or less antiseptic agents, the new process not only aims to penetrate the cellular tissue and coarser woody fibre, but also to form a chemical combination of these with the preservative chemicals. . . . [Here follows a detailed description of the Hasselmann system of impregnation.] . . . That timber impregnated by this system is proof against decay is shown by the practical tests

made by Professor Dr. Roesler, Director of the Royal Experimental Station at Klosterneuburg. This series of tests began in April, 1897, and was not completed until March, 1898. . . . The result of these tests in connection with his own investigations called forth the statement from Prof. Dr. Weiss, that he was firmly convinced that the Hasselmann system of impregnation was perfect and not open to any improvement. And this statement is still further endorsed and substantiated by the work of Prof. Heinrich Mayer, who proved by actual tests the impossibility of the growth of fungi or mold on wood impregnated by the Hasselmann system."

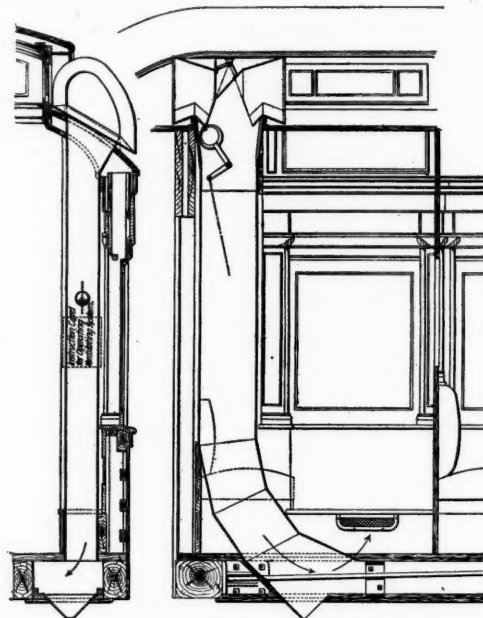
There is much more that I might quote from other authorities and experts on wood preservation, as well as from my own personal experience, but as my main object in writing you was to point out the errors in your issue of 12th inst., I must let it go at that.

A. G. WANIER,  
Supt. Barschall Impregnating Co.

#### Ventilating Passenger Cars on the Pennsylvania.

The accompanying drawing shows the general plan of the Pennsylvania Railroad system of ventilation of passenger cars. It follows somewhat the principle of the old Spear stove system of car heating. Fresh air is taken in through a hood or intake at diagonally opposite corners of the car, allowing it to pass through a conduit underneath the floor of the car into the space bounded by the outside sill, the first intermediate sill and the floor and false bottom—this space extending the whole length of the car. From this space the air passes up through apertures in the floor into heater boxes situated alongside the rock plank, where it is warmed, and from which it passes out underneath every seat into the body of the car, and thence passes up through the globe ventilators in the deck to the outside air.

The handle directly above the instruction card, as shown on the left-hand section, controls an ordinary damper of the butterfly-valve type, which is either



Passenger Car Ventilating System on the Pennsylvania Railroad.

set open or set shut. The hood contains inside of it a flat valve hinged at the top, which is operated by a horizontal shaft below, protruding through the side of the box toward the center of the car.

The instructions for operating the ventilating system are simple. In both corners of the car, the upper lever on the instruction box controls the flap valves in the hood and must always point in the direction in which the car is moving. The lower lever on this box must normally be kept "open." This lever controls the admission of air to the car and must only be moved to "shut" position when it is necessary to exclude foul or cold air. The instruction card also contains directions for regulating the globe ventilators at the top of the car.

Early in the consideration of the question of the ventilation of passenger cars, the engineers of the Pennsylvania Railroad were convinced that it should be worked out in connection with that of heating the car, and the system now in use is the result of a careful study of the problem of passing through a car during all seasons of the year a sufficient quantity of fresh air to maintain a wholesome atmosphere for, say, 60 persons, keeping the car comfortably warmed in winter and free from smoke, cinders and dust at all times.

It is generally agreed that perfect ventilation requires 3,000 cu. ft. of air for each person an hour, which for 60 persons would amount to 180,000 cu. ft. an hour. It is impracticable to pass such a quantity of properly warmed air through a passenger car, and it was not attempted. The calculations were made on the basis of 90,000 cu. ft. of air a car per hour, but this amount could not be properly warmed. After careful study and many experiments



for the purpose of determining the correct number, size and location of the intakes, the openings for admitting the air to the heating system, and the ventilators in the deck, in order to secure the proper balance between their respective capacities to take in air, to warm it, and to remove it, positive analyses show that good results are being obtained and that a car with the present system receives and rejects about 60,000 cu. ft. of air an hour. The system operates very satisfactorily when the car is standing as well as when it is in motion.

For nearly a year, the Pennsylvania Railroad have had under constant observation cars equipped with this system, and during the most extreme cold of last winter it was found that with all the ventilating apparatus open, it was quite possible to keep the car warm. During the warm weather, when there was no heat on the cars, it was found that the cars fitted with this system were better ventilated than the cars that did not have it.

### American Practice in Block Signaling.\*

BY B. B. ADAMS.

#### III.

##### THE WEST SHORE AND THE ERIE.

The most prominent roads which adopted the block system next after the Pennsylvania were the New York Central & Hudson River, the Erie, the Chicago, Burlington & Quincy and the West Shore, the latter now a part of the New York Central. The Central early adopted electric locking apparatus for controlling the operation of the signals in one cabin by apparatus manipulated in another, and its practice will be described in a subsequent chapter.

On the West Shore the practice is substantially the same as that of the Pennsylvania already described, though, in consequence of the much smaller volume of business, the arrangements are less elaborate.

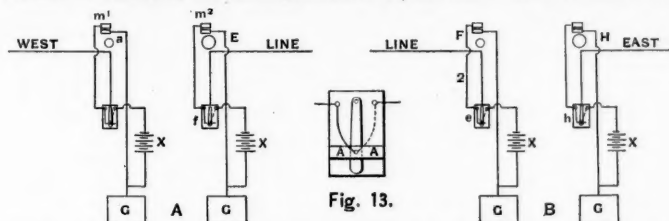


Fig. 12.—Wiring for Bell Circuits used in Block Signaling on the Erie Railroad.

Fig. 14.

orate. Nearly all the signal offices are in the stations. Permissive signaling is done only by written notice. That is to say, if a train is to enter a block section before the last preceding train has cleared it, the signalman, before permitting it to pass his office, delivers to the conductor and engineman each a notice in form like the following:

WEST SHORE RAILROAD—BLOCK CLEARANCE.  
A—, 8.10 A. M., Dec. 25, 1899.  
To Conductor and Engineman Extra 146:  
No. 3 left here at 7.55 A. M. Not clear at  
B— at 8.05 A. M.  
Jonas Smith, Operator.

A signalman on the West Shore does not record the time of trains at the preceding station; B records the time at B and at C, but not at A.

Where a freight conductor puts his train on a side track to be passed by more than one superior train, and the side track is not within the control of the signalman, the conductor sends word to the block-signal office what and how many trains he intends to wait for, thus insuring against misunderstanding.

The West Shore road was opened from Weehawken to Albany June 9, 1883, and to Buffalo January 1, 1884; and the block system was put in use from the start.

The Erie road (east of Buffalo and Salamanca) began using the block system in 1887. For about 46 miles, near New York (Jersey City to Turners) electrically locked apparatus is used, but on the rest of the road the practice is substantially the same as that which has been described, except that bells, with a brief code, are used, instead of the Morse telegraph with its comprehensive code. Thus the Erie was the first road in this country to establish block stations without the "Morse." The New York Central had several years before that put in use the Sykes apparatus on a few miles of its busy lines close to New York City, but every cabin had the telegraph also. The Erie in adopting bells and bell signals in place of the telegraph made a new departure, the radical difference between its method and that of most other roads being that in an emergency new signalmen could be obtained at shorter notice. A peculiarity of the Morse telegraph is that the process of learning to send and receive is very slow. With the bells but a limited code of signals

is possible or is attempted; and the code which is in every-day use and must be committed to memory is exceedingly brief, and can be mastered by anyone in a few minutes.

At the present time the greater simplicity of the bell code gives little or no advantage, in the matter of wages, because telegraph operators with considerable experience can generally be hired for the same pay that is required to secure non-telegraphers of the requisite mental equipment and moral character to perform the duties of a signalman.

Throughout the Erie lines the signalman is forbidden to give permissive signals except when authorized by the train dispatcher to do so.

The apparatus used in Erie signal cabins is almost as simple as a common electric door bell. Each cabin has two ordinary vibrating bells. The code of signals\* is similar in principle to that which has been used for many years in England. The arrangement of the bells, batteries and wires in two adjoining cabins is shown in Fig. 12. The apparatus at the first station is shown at A, and that at the second at B. The bell *a* is that on which A receives signals from the next station to the west. E, a bell of larger size, giving a different tone, gives him his signals from the next station to the east (B). At *f* is the transmitting key, having upper and lower contacts. The battery is indicated by X, and G is the ground.

The transmitting key *f* is shown on a larger scale in Fig. 13, in which A is a cross piece above or outside of the key. The full line shows the connection to the upper contact, against which the key is normally pressed by a strong spring, and the dotted line is the connection to the lower contact.

Referring to Fig. 12, the depression of key *f* rings the bell F at station B, the circuit being from the battery at A through key *f*, the line, upper contact of key *e* and wire 2. The depression of key *e* at B in the same manner rings bell E at A.

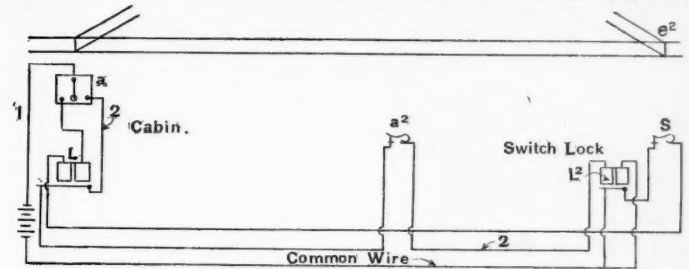


Fig. 16.—Electric Lock for Outlying Switches—Erie Railroad.



Fig. 15.—Passing Side-Tracks—Erie Railroad.

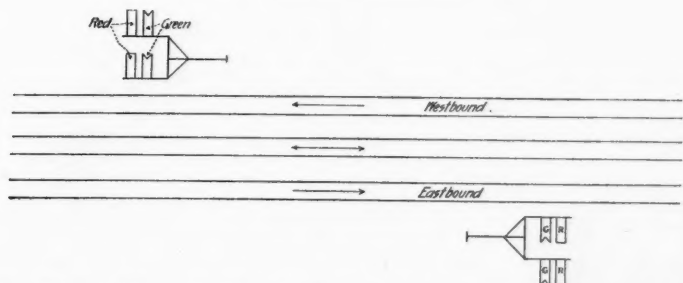


Fig. 17.—Block Signals on the Three-Track Line of the Chicago, Burlington & Quincy.

Bell H at B gives signals from the next cabin, C. The cost of fitting up a cabin with the bell apparatus is not materially different from that of equipping with the Morse telegraph.

#### (ERIE RAILROAD—BELL CODE FOR BLOCK SIGNALING.

- Number of Rings.
- 1 Acknowledgment of any signal except as herein provided.
  - 2 Yes.
  - 3 Is block clear? Answer by 2 or 5.
  - 4 Train has entered block.
  - 5 Block not clear.
  - 2-1 No.
  - 2-4 Has train cleared? Answer by 4-2 or 5.
  - 3-3 Train is on siding clear of main track.
  - 3-3-3 Train to you broken in two. Answer by repeating 3-3-3 to sender.
  - 4-2 Train has cleared.
  - 9 Stop train. Has no markers [tail-end signals].

The Erie has the block system on a number of single track lines. On such lines, where there are block stations without passing tracks, the procedure, under the bell code for blocking opposite trains is as follows: The signalman at B, Fig. 14, receiving word from A that a train is proceeding toward B, at once notifies C that such a train is coming; the sig-

nalman at C then takes care that no train leaves C going toward B until the train just signaled from A arrives at C. This is in addition to the regular bell signaling for making sure that each block (A to B and B to C) is clear, before any train is permitted to enter that block.

The arrangement of the signals at a typical block station of the Erie is shown in Fig. 15. The middle track, s s v v, is a siding to be used by freight trains which have to be set off to be passed by passenger trains. The switches, x x and z z, are worked by levers from the cabin, each pair of switches by a single lever. The levers are suitably interlocked with the signals, so that a switch cannot be moved until the signals which regulate the approach of trains to it are the "stop" position. The signals are all worked by levers in the cabin. The switches, *e* at the outgoing ends of the turnouts are worked by hand, not being connected to the machine in the cabin, but they each have an electric lock, connected by wire with the cabin, and they are thus under the control of the signalman. In connection with each of these switches is a derailing switch, *w*, worked by the same lever. When the switch is set for the main track the derailing switch is set to throw off from the rails any car or train which may by accident or otherwise be moved on the turnout toward the main track.

The arrangements are precisely alike for east-bound and westbound trains. On the approach of a train from the west (on track No. 2), which is to wait at this station for a faster train to pass it, the signalman sets the switches, z z, and pulls down the lower arm of the home signal *h*<sup>2</sup>, which gives the engineman the indication to proceed from track 2 to the turnout v v. This turnout is long enough to hold the longest train, or, say, 100 cars, 4,000 ft. After the train has cleared the main track, the switches, z z, are set straight, the lower arm of *h*<sup>2</sup> is restored to the stop position, and then by pulling

\*Previous articles in this series may be found on pages 4 and 34.

\*The principal clauses of the Erie bell code are as below. Publication of the full code is postponed, for the reason that a few minor changes are being made in some of the regulations.

down the upper arm the signal can be given for the fast train to pass through without stopping. If the advance signal *a*<sup>2</sup> can be cleared, the distant signal *d*<sup>2</sup> can also be cleared, thus giving the engineman ample notice of the position of *h*<sup>2</sup> before he reaches it, and thus making it unnecessary for him to slacken speed, even in case of a dense fog. After the passage of the fast train, the conductor of the slow train, stationed at *e*<sup>2</sup>, communicates by an electric bell, the apparatus of which is fixed in a box on a post near the switch, with the signalman in the cabin; and in response to this communication he receives notice, as soon as the fast train has reached the next station, that he may set the switch for the side track and move his train to the main track. The signalman, while giving this notice to the conductor, releases the electric lock on the switch. After the train has cleared the turnout and the switch, the conductor sets the switch for the main track and notifies the signalman, by the bell, that he has done so. Having given this information, he is at liberty to proceed to the next station, the signalman having made sure that the road is clear to that station before he let the freight train out. The signal *a*<sup>2</sup> is controlled by switch *e*<sup>2</sup>, the lever in the cabin which works this signal being locked by an electric lock which is governed by the position of the switch. Sig-



nal  $a^2$  is placed only about 1,500 ft. from the cabin, for the reason that if it were fixed nearer the switch, say at  $k$ , it would be too far from the cabin to be worked conveniently.

Dwarf signals,  $f$ , are provided for use when trains have to back out of the middle track.

The arrangement of the lock for an outlying switch is shown in Fig. 16. In the cabin there is a hand switch,  $a$ , and an electro-magnetic lock,  $L$ , which, when demagnetized, locks the lever of the signal  $a^2$ . To the arm of this signal is attached a commutator,  $a^1$ , which is closed only when this arm is in the stop position. A conductor at  $e^2$  desiring to move his train from the siding to the main track, communicates with the cabin by a bell, the circuit of which is not shown in the drawing, and the signalman, if ready to permit the freight train to move, turns his hand switch  $a$  to the right-hand point. This forms a circuit from the battery through wire 1, wire 2, lock  $L^2$  on the switch and back to the battery. The armature of  $L^2$  in being lifted releases the switch, which is then thrown by the conductor. It will be observed that this circuit could not have been made unless lock  $L$  was demagnetized, thus holding the lever of signal  $a^2$  in the normal or stop position; nor unless the signal was in the stop position keeping commutator  $a^1$  closed.

The opening of the switch by the conductor opens the commutator at  $S$ , which breaks the circuit through the magnets of lock  $L$  on the lever in the cabin. This prevents the signalman from inadvertently lowering signal  $a^2$  to permit another train to proceed toward the misplaced switch. This circuit, which runs through the left-hand contact point of switch  $a$  in the cabin, also runs through the armature of lock  $L^2$  on the switch, so that it cannot be completed except when the switch is set for the main track and is locked. The signalman, to permit the passage of a train on the main track, must pull the signal lever at  $L$ , and this he can do only when his electric switch  $a$  has been turned to the left hand point.

The officers of the Erie find that the cost of establishing a simple block station—that is, a cabin, with the necessary furniture and fitted with apparatus like that referred to in Fig. 12, is about five hundred dollars. The signaling for a passing station, like that shown in Fig. 15, costs about \$2,700. This includes the cabin, the interlocking machine and connections, two dwarf and six high signals (two of the latter with two arms each) and the electric locks for the outlying switches) with their connections.

The Chicago, Burlington & Quincy is the remaining one of the four railroads which made the earliest use of the simple telegraph block system on double track in America. About 1889 this road put up signals and cabins (usually remote from a station) along its double track line from Chicago to Aurora, 37 miles. Since then the space interval system has been put in use, but without special cabins or signals, on the rest of the main line through to the Missouri River; and automatic block signals are in use for four miles out of Chicago; but the part of the plant which calls for attention in this place is that between Western Avenue (Chicago) and Aurora, 33 miles. On this section the practice is, in the main, the same as on the Pennsylvania, and it will be sufficient to note the points in which it differs.

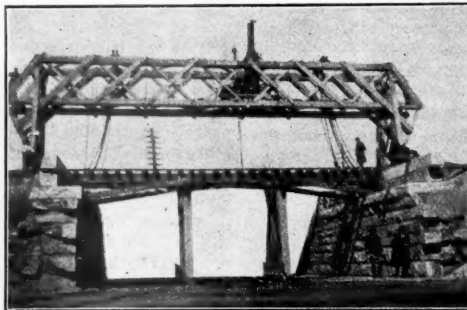
The first difference is in the special arrangement of signals for three tracks and for permissive blocking. On this section there is a third main track. The middle track is used for westbound movements (chiefly freight) during 12 hours of the day (4 p. m. to 4 a. m.), and for eastbound during the remaining 12 hours. The arrangement of signals for these tracks is shown in Fig. 17. The signals at the left side of the bracket post are for the middle track. The lower arm is not a distant signal, but is for use in permissive signaling. To allow a train to proceed before the preceding train has cleared the block section the signalman lowers the upper arm, but leaves the notched arm in the horizontal position. When both arms are lowered the engineman knows that the section is clear. The permissive signal is given only by a special order from the train dispatcher, which the signalman must record in his book. The dispatcher never allows more than two trains in the same block at the same time, and he usually requires a time interval of two minutes at the entrance of the block. At night and during a fog the rule requires the signalman to bring a train to a stop before permitting it to proceed under the permissive signal. East of Clyde this rule is in force at all times, and the signalman must deliver to the engineman a written notice ("caution card") advising him that he may expect to find the preceding train in the block section. Another rule in force east of Clyde requires the signalman to restore semaphores to the horizontal position after the engine and two cars of a train have passed, instead of waiting until the rear car has passed.

From Western Avenue to Clyde, four miles, signals are given by bells, as on the Erie; from Clyde to Aurora by Morse telegraph.

[TO BE CONTINUED.]

#### Travelling False Work for Short Bridges.

The false work, shown in the accompanying engraving, was built by the Berlin Iron Bridge Co. and used in the erection of all the girder bridges between Forest Hills and Boston on the New York, New Haven & Hartford Railroad. It was moved to the different locations of the bridges on the temporary regular gaged tracks, being pushed ahead by an engine. When in place and straddling the abutments, its running wheels were removed and put on uprights at right angles to the tracks on which it traveled. Rails were laid parallel to the faces of the abutments on which the false work traveled, to pick up girders from the cars and then to place them in the required location. By means of the drum of its engine overhead and a fixed cable, the entire frame moved itself on the rails at right angles to the main-line tracks.



As the photograph shows, the frame is on stilts, thus providing for the raising of the girder by means of a tackle to a height sufficient to clear the temporary trestle and loaded car, and placing this girder on the opposite side of the trestle. These trestles were shifted along the bridge seat of the abutments to give place to the permanent bridge work.

The girders were delivered on flat cars, and unloaded by this deck system of false work, which permitted the loaded cars to pass under. It took about 20 minutes to pick up a girder and place it. The girders were solid and averaged 3 ft. in height and 50 ft. in length.

#### Counterbalancing Locomotives.

At the December meeting of the New York Railroad Club, Mr. Hammerblow Lockwood introduced the novel subject of counterbalancing locomotives. The following extracts are from Mr. M. N. Forney's contribution to the discussion:

Mr. Lockwood has been before the public in relation to this subject for a long time, and I think that he has, at any rate, had a good influence—he has acted as a stimulant. He has stirred us up. His effort has been somewhat like administering red pepper. He has made us sneeze a good deal and kept us concerned about the problem in which he has been interested.

The large amount of counterbalance which is now necessarily put in the heavy engines which we are building certainly must have a very destructive effect upon the rails and bridges, but no one has pointed out yet very clearly how we can get over that difficulty. My own conviction about it is that the nearest approach to a remedy is in the plan of engines that have been built for some of the French roads, one of which was exhibited at the Chicago Exhibition. They are four-cylinder compound locomotives, having two high-pressure cylinders outside the frames and connected with the back axle, and two low-pressure cylinders inside, connected with a leading crank axle. Now, when you talk to an American engineer about a crank axle the bristles on his back immediately begin to rise. People here seem to feel that crank axle is an insuperable objection to any locomotive. My own view of the matter is that the objections to it are not as great as are popularly supposed. In the first place, the means of manufacturing crank axles that we have now are very different from what they were twenty-five, thirty or forty years ago.

There is another thing to be said about the French type of engines, and that is this: By connecting the high-pressure cylinders to the rear axle, and the low-pressure cylinders to the front axle, the power is distributed between the two, and those of you who were at Chicago may remember that the parts of the French engine were very light. I don't think I ever saw a locomotive of its capacity in which the details were as light as they were on that; the reason being that the power was distributed, as I say, between the two axles. So it necessarily follows that the crank axle would be strained very much less than it would be if you drove the entire locomotive from the cranks. Therefore I think with engines of that type the crank axle would be less objectionable than it would be on an ordinary locomotive.

There have been a number of other plans proposed for counterbalancing engines. One was used by a Mr. Brown, who was for a long time superintendent

of the locomotive works in Winterthur, Switzerland, who used on his locomotives a walking beam, which has also been used in this country. This walking beam was pivoted in the center, and the cylinders were connected to its top, which moved backward and forward, the connecting rod being connected to its lower end. The result was that the pistons moved in the contrary direction to the connecting rod. By making them of equal weights, one balanced the other. That plan has been used only on comparatively small locomotives. But it has always seemed to me that it had very considerable merit and would be applicable to four-cylinder compound locomotives whose cylinders are all placed outside, as in the Vaucrain engines. Thus far no one has been brave enough to try that plan.

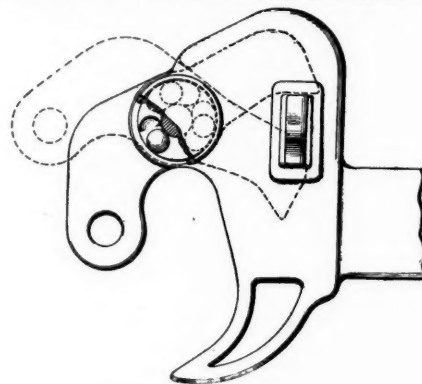
If an entirely satisfactory method of counterbalancing locomotives and getting rid of the heavy balance weights which we must now put into the driving wheel could be devised, it certainly would be a great improvement on the modern locomotives. The balance weights, of somewhere from 500 to 600 or 1,000 lbs., are simply dead or inert; they absolutely do nothing but counteract the momentum of the other parts. If we could take that amount of weight out of the driving wheels and put it into the boiler, or put it somewhere where it would be of some service and do some good, that of itself would be a very important improvement in locomotives. But up to the present time the problem seems to be almost insoluble. I have tried my own hand at the question of counter-balance, and if I had thought a little bit farther ahead I would have brought a model of my driver here and shown it to this audience. The plan is untried, so it is not certain that it will work. But I feel sanguine that it will.

#### Sabine's Automatic Car Coupler.

Mr. H. Sabine, of Marysville, O., formerly Railroad Commissioner of the state of Ohio, has brought out a coupler embodying several patents which have at various times been granted to him. The fundamental object which he has sought has been to secure reliable opening of the knuckle by gravity when the coupler is unlocked. Of course the reader has been familiar for some years with the idea which has been embodied in other couplers of having the bottom of the hub of the knuckle made in the form of a spiral inclined plane which rests on a similar plane in the coupler head. Then when the knuckle is unlocked gravity causes it to slide down and turn on this plane. Obviously, it will not take much rust or dirt to cause the knuckle to stick fast unless the planes are pitched steeper than is practicable.

Mr. Sabine's expedient is to insert ball bearings between these planes. He introduces preferably three balls which are placed in grooves around the pivot pin. Balls of about 1 in. diameter are believed to be the proper size. We have no drawing suitable for reproduction which shows this device, but the arrangement is so simple that it hardly requires a drawing to make it plain.

The ball races are inclined in the direction of the movement of the ball and also toward the center of



Sabine's Automatic Coupler.

the pivot pin, making a three-point bearing for the ball.

The principle is applied to old couplers by suspending the knuckle by the pivot pin and causing that pin to rest on balls placed under its head. A plan view of this arrangement is shown in the engraving. This again is an extremely simple arrangement and needs no further description. The suspension of the knuckle from the pivot pin is accomplished by cutting a groove in the pin and a corresponding groove in the knuckle and inserting a key.

Mr. Sabine has taken out a patent for a spiral spring coiled around the upper part of the pivot pin with one end engaged in the knuckle and the other in the coupler head, which will furnish an impulse to throw the coupler open. This device, however, is not thought necessary nor is it recommended, as it introduces a needless complication.

Incidentally, the engraving shows the general form of the locking pin, which, it will be seen, is unusually wide and which rides on the shank of the knuckle



when the coupler is opened. In spite of the introduction of the ball bearings the whole apparatus is very simple.

Various details have been contrived for introducing pieces of hard metal in existing coupler heads in case it is thought desirable to change couplers in that way and so apply the ball bearings to old couplers.

#### The Law of Union Stations in Florida.

The Supreme Court of Florida has decided that the Jacksonville Terminal Company, owning the Union passenger station at Jacksonville, must allow the Atlantic, Valdosta & Western Railway to connect its tracks with those of the station and to run its trains in and out, on payment of a reasonable price. This decision is looked upon in Florida as important, as it sustains an order of the State Railroad Commission and upholds the constitutionality of the law under which the Commission performs its functions. The Commission held not only that the Terminal Company was a public institution, like a railroad which is a common carrier, and therefore must be operated primarily for the benefit of the public; but went farther and required the A. V. & W. to connect its tracks and run its trains into the station, this being deemed a convenience to which the public was entitled. The Commissioners decide that the A. V. & W. must pay \$1,275 quarterly in advance and also pay an additional sum toward the expenses of the station, according to the number of cars or trains run, as compared with the total number using the station; also pay for all supplies and repairs needed. To properly perform this duty to the public

capacity, and to make its charges reasonable. The public interest requiring the A. V. & W. to be admitted to the privileges of the station, it is an abuse not to accord those privileges; and if an excessive charge is made that is an unjust burden on the public.

As to the charge of appropriating private property contrary to the constitution, the Court says that the Commissioners, under power granted them by the Legislature, have determined that the Terminal Company is discriminating against a particular railroad and that this is unjust, being contrary to the best interests of the public. It is no more an appropriation of the property of the Terminal Company than is the law which requires common carriers to transport all persons at a reasonable rate of compensation, or the law which requires an inn keeper to furnish accommodations to all who apply and at reasonable rates, if the Legislature prescribes rates.

#### The Simonton Gear for Hopper Bottom Cars.

One of the latest devices for working the doors of hopper bottom cars is shown in the accompanying illustration. This gear, patented by Mr. J. Simonton of Altoona, a little more than a year ago, has been put on several thousand cars on one railroad, and other roads are trying it. It was first used experimentally in 1896. The operating mechanism is put directly underneath the center stringers of the car and the levers and sheaves are boxed in so as to prevent them from being clogged by the lading. The device is made up of four main parts, the hangers, the links, the sheave and the operating chains. The

These are the facts as they appear to me, after a stay of three weeks on the Isthmus, during which I was able to see substantially the whole line of the canal, from the Island of Naos in the Bay of Panama, where the excavations for a channel begin, through to Christophe Colomb, where the interior harbor has been constructed, connecting with the Atlantic Ocean.

I sailed in a small steamer from Naos up to the mouth of the Rio Grande, where the Panama Railroad has built a fine modern iron pier 1,000 ft. long, roofed and equipped with rapid transporters, and with a connecting basin adjacent to the canal deep enough for the accommodation of such steamships as run to Panama. The channel from Naos to La Boca, as the locality of this pier is called, is 300 feet wide, perfectly straight, and marked at frequent intervals at each side with buoys intended to be lighted at night. So the canal may be regarded as nearly completed up to La Boca; above there it has been once completed for a distance of some miles, but has now become considerably obstructed by sediment brought down by the streams which empty into it or into the Rio Grande. . . . Everywhere, through the portions of the canal which have once been finished, the banks have retained their integrity, and the canal still looks to be in first-rate condition. . . .

From Bohio, 27 kilometers from the Atlantic, I passed, upon another small steamer, without obstruction to the pier at Christophe Colomb; yet much of the once completed canal has been silted up and will require to be again excavated. . . .

I had always heard of the Chagres River as the

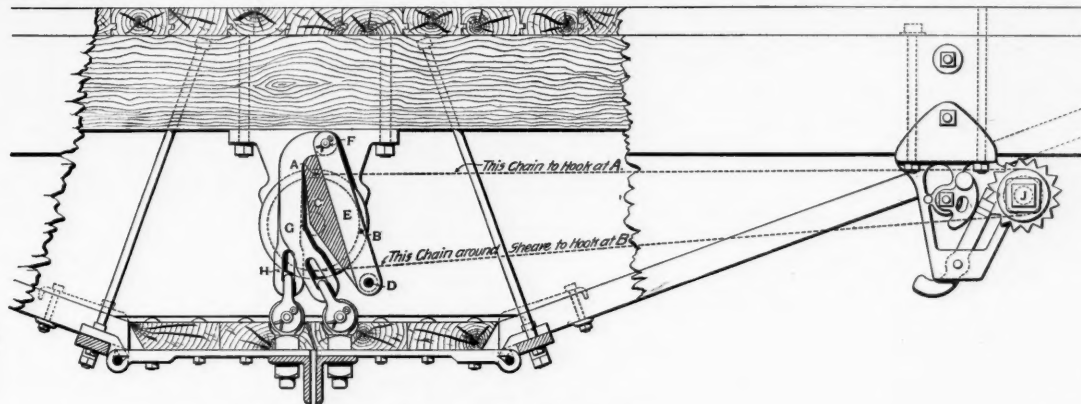
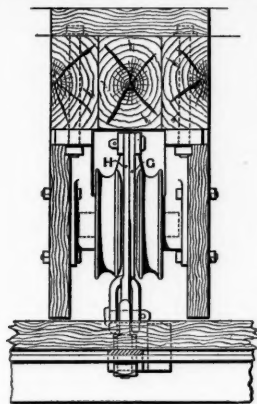


Fig. 1.—The Simonton Gear for Hopper Bottom Cars.

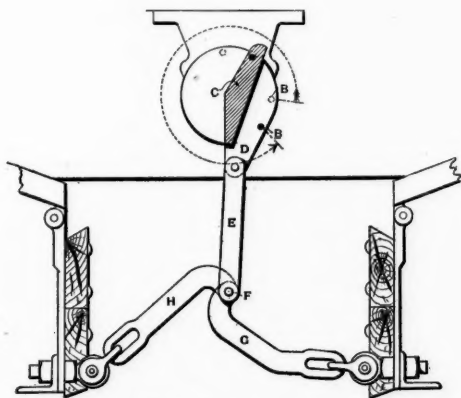


Fig. 2.—Open Position of Gear.

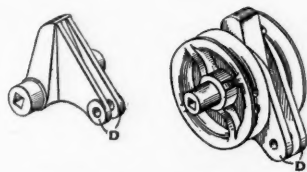


Fig. 3.—Sheave and Lever.

two hangers, G and H, are fastened by links and eye bolts to the doors. They are pivoted to the link, which in turn is fastened to a lug on the periphery of the sheave wheel. The chains are attached to a worm on the shaft J, Fig. 1, and thence extend to the sheave to which they are attached at A and B. When closed, the weight of the doors and the load on them rest on the projection from the sheave wheel and through it on the trunnions, which are practically in a line below it. Two chains are used so as to give a positive movement to the sheave in either direction, one being required for closing and the other for giving a downward push (if required) on the doors in opening.

The mechanism works as follows: Between the sheave, shown in Figs. 1 and 3, is a lever on which lugs are cast, as shown at D, Fig. 3. The link E is pivoted to these lugs and rests on the plain surface of the lever C when the doors are closed, as shown in Fig. 1. At the end of this link, at F, are attached the two operating rods H and G, to which the doors are fastened. In opening the doors, the sheave is turned by the lower chain, and in closing by the upper one. In opening the doors, the link is turned around and this in turn forces the operating rods downward. When the doors are completely opened, these rods are in the position shown in Fig. 2. It requires almost a complete revolution of the sheave in passing from the closed to the open position, as indicated by the arrow in Fig. 2.

The Simonton device can be placed on long gondola cars, using the same irons that are used on a hopper car, thus making it necessary to carry in stock only one kind of material for the several classes of cars.

#### The Actual Condition of the Panama Canal.

In the February issue of the Engineering Magazine appear some notes on the Panama Canal, by Mr. Charles Paine, General Manager of the Panama Railroad. They are of especial interest and value, considering the occasion, and also the experience and judgment of the writer. We reprint some extracts:

imposing and irremediable difficulty which rendered this route impracticable for a canal, and I now feel much astonished that any engineer should have lent his voice to confirm such an opinion. The Chagres, even in time of flood, is a comparatively small stream. . . . The present scheme of the Canal Company, to control both the upper and the lower reaches of the river by two dams, seems a good expedient; the upper artificial lake will afford a permanent supply of water for the higher levels of the canal and the lower lake will form an integral part of the navigable canal. . . . Indeed, there is only one real difficulty, which will be to raise the necessary funds to be expended where there had been so much waste before.

The Culebra cut is perhaps the greatest excavation ever undertaken—I believe it to be the biggest; but it has been attacked in the most fearless manner, and, since the resumption of work by the New Canal Company, without any cessation; several thousand men with the necessary excavators, trains, etc., have been and are at work daily upon it. It has seemed to me the most difficult problem here is to find places for depositing this mountainous mass, after it has been excavated, but I am assured there is room enough and to spare.

There are many other good problems for the exercise of engineering ability which would take too long to describe, and I do not wish to minimize the real and quite serious problems of that kind which are presented by the Isthmus; but I declare that "the Chimeras dire" which have been so much talked of, never had any existence, and upon the approach of intelligent exploration they disappeared.

The engineers of the company say that about two-fifths of the work necessary for the completion of the canal at the level adopted for the bottom of the summit level is already done. This level will be 68 ft. above tide.

It has been generally known that there was an enormous preparation made for the prosecution of the work by the original Canal Company; yet I had not received even a faint impression of its extent until I came upon the ground. The Isthmus, along the line of the railroad, is covered with dwellings, sidings, contractor's plant, and materials for construction of every description. The dwellings having been built of galvanized corrugated iron have suffered little depreciation; they could house twice as many officials and workmen as are likely to be at any time employed. The scale upon which these things were done is illustrated by the fact that the old company built at Panama, upon the Ancon

the A. V. & W. was ordered forthwith to tender the required sum of money and to proceed to connect its tracks.

The Terminal Company continuing to object, the Commissioners filed mandamus proceedings; and the Circuit Court decided against the Commissioners; but the Supreme Court reversed this decision.

The Terminal Company's argument in court was that the Commission could not regulate trains in a case like this, except those engaged strictly in intrastate business; that the order was a taking of private property of one corporation for the use of another, contrary to the constitution of Florida, and also without proper compensation, ascertained by a jury. In addition to these, numerous technical points were presented. The Supreme Court holds, in substance, that the regulation made by the Commission is not in itself unreasonable, has appropriate relation to the public safety and convenience, does not go beyond the necessities of the case and does not materially interfere with interstate commerce. The regulation is not directed against, but is in the aid of, interstate commerce. The Terminal Company is engaged in a business affected with a public interest. Its property is private, but it has devoted it to a public use. The State does not undertake to compel it to devote its property to a public use; but, the company having voluntarily done so, the State will require it to furnish suitable terminal facilities for the proper accommodation of the public. For the common good the Legislature may require it to admit all railroad common carriers to the extent of its



Mount, a beautiful group of buildings for a hospital at a cost of two millions of dollars, which is very little used, but is maintained in good order by the present Canal Company under the care of Sisters of St. Francis. The company has a branch hospital at Colon, and a sanitarium on the Island of Taboga, which is as large as a summer hotel. All these very little used, but ready. As to the plant, of dredges, barges, dump-cars, excavators, boilers, pumps, track, etc., only an inventory could give an idea; for instance, there are four hundred and twenty contractors' locomotives. All these things are on the ground, and with a little oiling and slight repairs are ready to resume work. There are machine shops fitted up completely, with foundries attached, ready to effect any required repairs, and warehouses containing all the materials necessary for making them. Doubtless many of the dredges will need extensive repairs on their hulls, but there are shipways and shops expressly for their accommodation. Out of curiosity I went through twelve of the commissary's long storage buildings at Colon, in which each class of material is neatly piled, numbered, and catalogued, so as to be available upon requisition. Every conceivable material, tool, or piece of apparatus which may be needed for special work or for repairs is in the warehouses. . . .

But all these materials and apparatus on the spot, ready for business, will seem of less importance to an engineer than the perfect state of preparedness of the surveys and plans. Every site has been explored, sounded, drilled, and tested; so that the exact character of every cutting, foundation, and superstructure is shown upon elaborate drawings. Practically, there is more surveying or studying to be done; even if a proposed structure were to be modified, the information required for the engineer's use is ready in the office. . . .

There is one more chimera deserving of special attack, and that is the idea that the Isthmus is remarkably unhealthy. The great preparations made by the old Canal Company indicate that it was expected to be so; perhaps the care taken by that company in the drainage of the sites chosen for its buildings and the concentration of the flow into the large streams, have rendered the country more wholesome; certain it is that there is no more sickness among the very considerable population now on the Isthmus than there is among any other equal number in the tropics. The railroad and canal employes now living there are perfectly free from any unusual diseases.

The railroad in operation, and so close to the canal that a siding may be connected with its banks at any desirable point, is a material advantage in the construction of this canal; there are sidings now laid at nearly every station, for the accommodation of the canal plant, which have been disconnected from the railroad tracks, yet only require the replacing of a few rails to be ready for the delivery of supplies. I should guess that the Canal Company must have fifty miles of such tracks, with rails for as many miles more, but this is only a guess. The Canal Company maintains a telegraph line and a telephone wire across the Isthmus, with frequent stations.

I may point out that there are good harbors at each end of the Panama route which are in daily use by several lines of steamships, and also that these harbors are provided with the usual adjuncts, such as wharves, warehouses, coaling and watering facilities, and machine shops, where ordinary repairs can be made. Also that the value to commerce of any ship canal will be about inversely as the square of its length when compared with that of another. Now, if we are really interested in having a canal between the oceans, here is one much shorter than any other possible line, already half built, if the extent of preparedness is taken into account; why not take hold and build it?

It seems to me that no engineer can cross the Isthmus without being convinced, as I am, that this is a perfectly practicable route and the most desirable one for a canal.

#### Electro-Pneumatic Interlocking at the Boston South-east Station.

By J. P. Coleman.

(Continued from page 50.)

To render clear the general principles governing switch and signal operation as embodied in the electro-pneumatic interlocking system, and which are fundamentally based upon the facts already mentioned, the diagrams A, B, C, D, E and F are presented.

#### The Signal Lever.

Diagram A shows an ordinary lever of the mechanical type arranged to normally stand centrally, which has attached to it a circuit shifter that closes a circuit operating one signal when moved forward and which closes a similar circuit on a second signal (conflicting in function with the first) when moved backward. When the lever is normal, and both signals are, in consequence, at danger, the lever is not engaged by the lock. When the lever is moved to

clear a signal, the latter, on leaving the danger position, opens the circuit controlling the lock which immediately engages the lever and prevents its complete return to normal, as is illustrated by diagram B.

The lock permits of a partial return of the lever to normal, however (Fig. C), an amount sufficient to interrupt the circuit controlling the signal, but insufficient to release such mechanical locking as is operated by it (not shown), and which should remain effective until the signal is absolutely at danger. This partial movement of the lever toward normal acts to cut off the power holding the signal at safety and permits its return by gravity to danger. Should it for any reason fail to so return, it is obvious that the lever operating it is prevented from being put normal, and hence a change of route from the one governed by the deranged signal is prevented.

(A second lock similarly controlled by the signal in its extreme safety position might be added to detect failures of signals to move to safety in response to their levers, but this is not warranted by the comparatively insignificant results that may follow failures of signals to leave the danger position.)

It will be seen that besides forming a safe means of "selecting" and operating signals, even during derangement, this method also provides within itself the most positive form of locking between two conflicting signals that can be devised, since the lever cannot assume two positions at one time.\*

In adapting the signal lever to the control of the four signals arranged as shown in Fig. 2, the wires operating the two opposing signals of Fig. A, B or C would be each passed through a circuit shifter (a selector) operated by the switch lever, so that the direction of traffic would still remain under the control of the signal lever but the signal operated for the route of the direction so selected would be determined by the position occupied by the switch at the time. See Fig. 3.

This arrangement would necessitate extending the circuit or the signal lever lock to the control of the two added signals, so that any one of the four being operated would produce the same effect on the lock as would either of the two signals of the arrangement shown in Figs. A, B and C. This extension of the lock circuits is purposely omitted from Fig. 3, that the controlling circuits may be the better understood.

If we introduce other tracks and switches, and the necessary signals to govern movements from them over the switch shown in Fig. 3, an extension of the "selecting" method may be made to include the operation from the same lever of all signals involved; but on condition that the track and traffic conditions never require but one signal to be operated at a time. When two or more signals may be operated simultaneously they naturally require for this the use of two or more levers.

#### Switch Lever.

Figs. D, E and F represent a mechanical lever equipped with attachments for operating a switch through the medium of an electro-pneumatic switch movement. As stated in the article describing this latter device, there are two electro-magnets involved in its construction which perform the function of indirectly shifting a switch from one position to the other, when alternately energized by currents of electricity from the interlocking machine. A third magnet was also described as attached thereto, between the others, that performs the function of locking the slide valve of the device against movement by the shifting magnets unless this magnet is energized with one of the latter—a precautionary device entirely, as was stated in the articles referred to.

Mounted over the switch-operating mechanism proper, as was also explained, are two pairs of contact springs each so arranged as to close an electric circuit when the switch movement reaches the extremities of its stroke, after the locking of the switch by the movement is positively effected.

These contacts control electric locks engaging the lever operating the switch, as is shown in diagrams D, E and F. When the lever assumes the position shown in Fig. D, the indication magnets, N and R, their armatures and the tappet engaged by them, assume the positions shown. The circuit shifter C N L and R (which is in a sense a selector) operated by the lever, and which controls the circuits affecting the switch valve magnets, also assumes the positions shown.

Normally, a current of electricity is energizing valve magnet N, but the other two magnets of the switch valve, being disconnected at the machine, are de-energized, as is apparent. The effect of this condition of the magnets is to retain the air pressure against one end of the switch cylinder piston and hence to hold the switch in one of its positions.

The armatures of the indication magnets N and R do not prevent a partial movement of the lever from normal—a movement that is sufficient to shift the

\*Incidentally it may be noted that if the track between the two signals shown in Figs. A, B and C be equipped to form a rail circuit, and that if the relay of this circuit be made to control the circuit operating the signal, one of the most perfect methods of blocking a single track is secured—an automatic system under manual control.

current from valve magnet N to valve magnet L and R—as is indicated in dotted lines on diagram D, the effect of which is to de-energize the former and to energize both of the latter.

Valve magnet L is energized the instant the lever is moved and before the current is removed from N and applied to R, thus the lock of the switch valve (controlled by L) is withdrawn during the lever movement—the energizing of R and the de-energizing of N following immediately thereafter as does the operation of the switch.

This partial reversal of the lever can (through the usual mechanical locking provided between switch and signal levers) be made only when all signals governing movements over the switch operated are at danger, and when so moved it retains locked at danger all such signals until its reversal is effected. Its complete reversal cannot be accomplished as before stated, until the switch has responded completely to the partial lever movement, and until it is secured by the bolt lock of the switch movement in the position last moved to. This is insured by the two electric locks N and R, controlled by the two sets of contact mounted on the switch movement.

When the complete movement of the switch is effected and the bolt lock of the switch movement has secured the switch in its reversed position, the plate P is shifted by the movement into contact with springs, R, R.

The effect of the circuit thus established on the indication magnet R at the machine (which circuit is formed in part by the wire extending from the machine to the center valve magnet, largely for the sake of economy in wires employed and for the convenience of the arrangement) is to energize this magnet, and to thereby lift its armature from longer obstructing the movement of the lever to its extreme reversed position. Fig. E.) The final movement of the lever may then be made, which releases the mechanical locking that was heretofore in effect, preventing signals being cleared for movements over the switch, and at the same time shifts the switch-controlling contacts to the position shown in Fig. F, the effect of which is to at once remove the current from the valve lock magnet, and that one of the indication magnets previously energized, whereupon the switch valve becomes locked in its reversed position and the indication latch R is released to again engage the lever when its reversal is again required.

Precisely the same conditions govern the return of the switch and its lever to normal; but the other pair of contacts, N and N, on the switch movement, and the other indication magnet, N, engaging the lever, are called into play for this purpose.

Under the tappet engaged by the latches of the indication magnets is arranged a circuit shifter controlling these magnets that is given motion by the tappet only after the latter has been released and after the lever has been put into one or the other of its extreme positions. This arrangement is designed to insure the impossibility of any other than that magnet which corresponds with the position of the switch sought being in circuit at any time—a precaution designed to guard against "false" indications resulting when the switch is momentarily in one position and the lever is in a semi-reversed position tending to shift it to the other.

From the nature of power interlockings, none of which produce an instantaneous response of switches or signals to lever operations, this condition momentarily exists in all of them, and it is the problem of safely controlling lever and switch movements in this respect that will remain the vital one involved. It is the ability to instantly and completely withdraw the operating power from one indication device before applying it to another, by the use of electricity, that makes this mode of control preferable to a method employing compressed air alone for this purpose, since the latter, to be effective under all reasonable conditions, must exhaust the pressure from one pipe before applying it to another—consuming valuable time and introducing a complication of mechanism as a result of its use, that are entirely avoided by the electrically operated arrangement described.

The mechanical locking that would apply to the situation shown in Figs. 2 and 3 would be the same between levers 1 and 2, whether the switch and signals were operated by them mechanically or pneumatically. This would also be the case with a track and signal arrangement more extensive than that shown, and, were the work accomplished by each additional lever the same in both systems. Hence the difference between the locking required by a pneumatic interlocking machine and that required by a mechanical one, applied to the same track and signal arrangement, results solely from the greater number of levers that are in practice required by the latter.

This is vividly demonstrated on a small scale by the locking mentioned as applying to Figs. 1 and 2—that of Fig. 2 being the locking that would apply to a pneumatic machine of the same capacity as the impracticable mechanical one applied for the purpose of illustration to that arrangement. Mechanical locking is, therefore just as essentially a feature of the pneumatic machine as it is of one of the mechanical type.

Evidently the work performed directly by the op-



erator's energy in the pneumatic machine is that required to shift such mechanical locking as circumstances require attached to it, and such electric contacts as the switch and signal moving devices require for their control from it (the actual work of shifting the switches and signals being here assigned to air cylinders suitably attached to them), and the relatively heavy construction of the levers of the mechanical machine is obviously ill-proportioned to this comparatively uniform and extremely light duty. This fact constituted in itself a sufficient reason for departing from the general dimensions of that apparatus in designing the first pneumatic machine built. The incorporation of circuit shifters, electric locks and conductors in the construction of the pneumatic machine that find their counterpart, when such

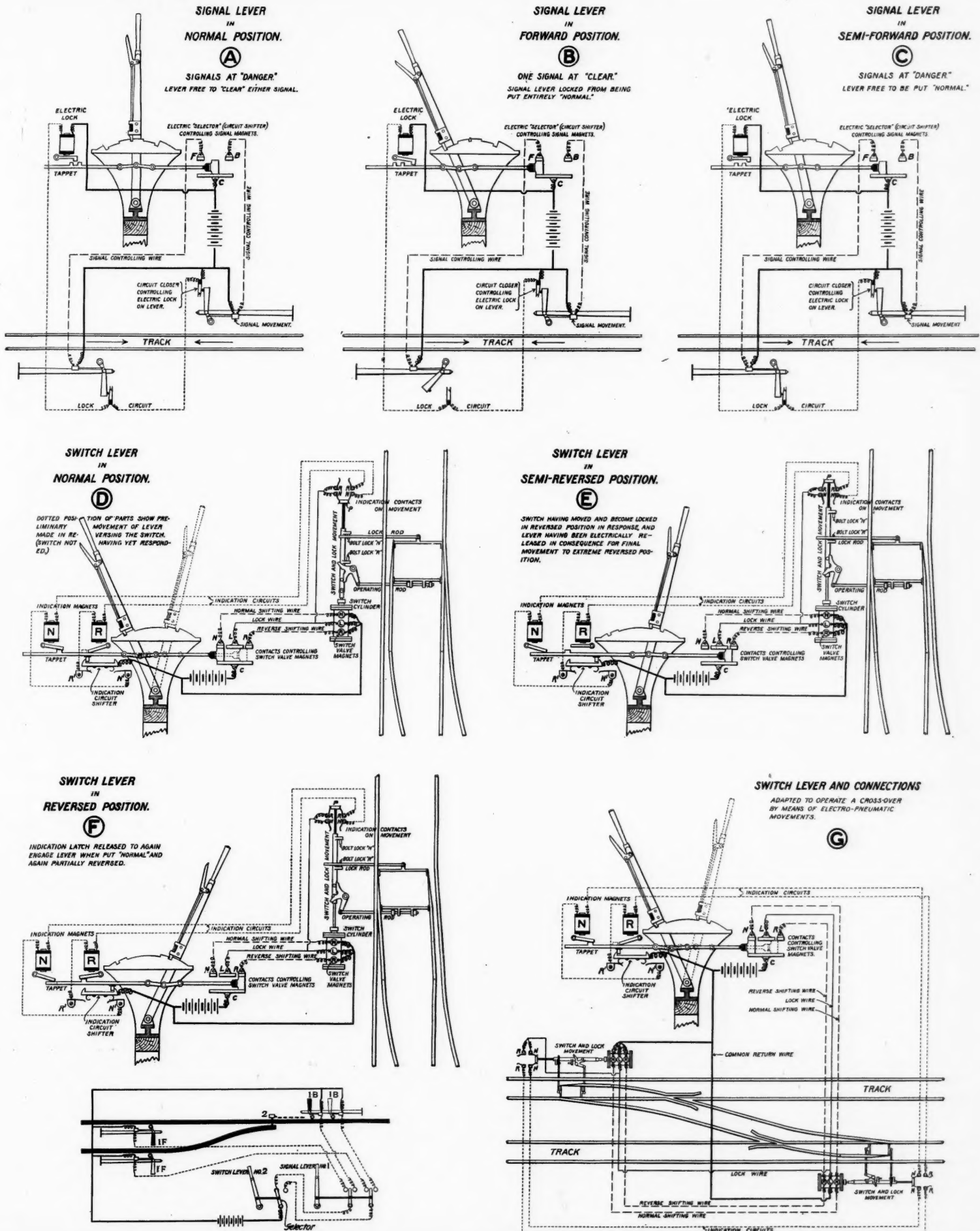
exists, in mechanical interlocking, in selectors, pipe and wire lines manually moved, quite naturally involved further departures from the lines of the mechanical apparatus, and, as a result, the pneumatic machine bears no resemblance to them to-day.

Though this machine differs widely in design from those of the mechanical type, its fundamental features are well illustrated by the arrangement of and the attachments to the two mechanical levers shown in Figs. A, B, C, D, E and F. The signal levers stand normally in a central or intermediate position and move to the right and to the left, similarly to that shown in Figs. A, B and C, and operate in like manner one or the other of two or more signals that conflict in function. They have electric locks engaging them that are controlled by the signals

they operate and they perform by mechanical means the locking of levers that conflict with them, in exactly the same manner as does the signal lever of Figs. A, B and C.

Switch levers stand normally to the left of a central position and operate, when partly reversed, contacts that cause the shifting of the switches, and they are in turn controlled from the switches through the medium of electric contacts thereon, and wires leading therefrom to electro-magnets engaging the levers, and in substantially the same manner as that described as applying to levers of Figs. D, E and F, but by devices more or less different in structural arrangement, as will be made apparent in a general description of the electro-pneumatic machine.

[TO BE CONTINUED.]



The Theory of the Westinghouse Electro-Pneumatic Interlocking Machine.





ESTABLISHED IN APRIL, 1856.  
PUBLISHED EVERY FRIDAY.  
At 32 Park Place, New York.

#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to improvements. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

Accompanying this issue is our semi-annual Construction Supplement of 44 pages. Among the features are the revised table of railroad building for 1899 and the new lines and extensions now building or proposed in the United States, Canada and Mexico. Of these latter there are no fewer than 1,350 by about 1,030 companies. Some 347 of these are now building against only 255 six months ago, and but 125 at this time last year. The supplement also contains statements of between 800 and 900 bridges of all kinds in the United States and Canada, for which contracts are yet to be let. Altogether the supplement is a striking exhibit of the revival of activities in the railroad field which we now enjoy.

#### 2½ Cents a Bushel, Buffalo to New York.

Not the least significant among the various comments on the Erie Canal report which is now before the New York Legislature is that of Mr. Callaway, President of the New York Central, who is quoted by the newspapers as saying:

"If Governor Roosevelt and the State will agree to pay to the New-York Central a sum of money equal to a fair rate of interest upon the proposed expenditure of \$60,000,000 for improving the canals, I will agree to haul all grain from Buffalo to New-York free of charge that may be offered for transportation."

It appears that Mr. Callaway estimates interest at 4 per cent. (\$2,400,000), and adding \$500,000 a year for running expenses, he has \$2,900,000, or, in round numbers, three million dollars, which, at three cents a bushel, would carry 100 million bushels of grain. But Mr. Callaway says in another place that the Central carries grain from Buffalo to New York and delivers it at the ship's side for 2½ cents a bushel. At this rate he could carry a third more. This would bring the total nearly up to the total receipts at New York by all routes during 1899, which were about 140 million bushels. Whether Mr. Callaway means to suspend his offer while the canal is frozen up, is a point which has not been explained. He certainly could in all fairness do so. Neither are we told how many years the offer is good for.

The volume of grain moved in the past year may be small compared with what will be offered 25 years hence, or it may be large. Other countries are also developing their wheat fields and perhaps we have reached something like the top of our grain exports; or perhaps not. But a canal would be expected to last forever, and its capacity would be many times 140 millions of bushels of grain annually. The capacity of Mr. Callaway's railroad is indeed many times the quantity named, though there is a limit to the quantity which he can afford to carry for \$3,000,000. Inasmuch as the distant future must, therefore, enter into the calculation, and as Mr. Callaway's offer is somewhat informal, it will not perhaps be worth while to discuss the point at this time.

But whatever is done with the offer, the statement is of interest, as the first public avowal of

the rate which has been accepted by the New York Central on the grain which it has taken in competition with the canal. The lowest rate heretofore mentioned by the grain men is, we believe, 2½ cents, with the point of delivery always left indefinite. Now we have a rate of 2½ cents with delivery anywhere in the harbor. On corn this last rate equals almost exactly four cents a hundred pounds, 80 cents a ton and (for 440 miles) 1.81 mills per ton-mile. This is not astonishingly low for a level road, carrying whole train loads, for half a dozen of the great companies have brought grain through from Chicago to the Atlantic seaboard at rates about as low as that. But what shall we say when we come to consider the cost of lighterage from the car to the ship's side? The usual allowance for lighterage in New York harbor is 3 cents per 100 lbs., equal to 1.68 cents a bushel on corn. Deducting this from 2.25 cents, we have less than six mills a bushel, through, or less than ½ mill per ton-mile as the share accruing to the railroad proper. This is, of course, cheapness beyond reason, and such a rate would not be kept up long, even as a war measure. But the Central must pay at least cost for lighterage, and it must pay something for loading at Buffalo; so that the railroad service proper must have been performed for a good deal less than 1.8 mills per ton per mile; very likely as low as 1½ mills, and possibly lower. Whatever may be Mr. Callaway's expectation as to the cost of hauling freight hereafter, it is clear that for the present—that is, last summer—and for the purpose, incidentally, of sustaining New York as against the "outport" enemies which the Commerce Commission complains of, he is willing to carry freight at prices which heretofore have been looked upon by everybody as below cost. Apparently the powerful locomotives and the 40-ton cars recently bought by the Central have effected an economy even greater than any thus far mentioned in public discussions.

#### The Railroad Spiral.

In the Railroad Gazette for June 30, 1893, p. 490, there was acknowledged the receipt of a pamphlet on "The Transition Curve," by Mr. E. S. M. Lovelace, M. Can. Soc. C. E., and the suggestion was made that while the curve seemed simple and practicable, the limits of the tables were not well chosen. Mr. Lovelace has found this to be true, and that his formulas were rather too complex for field use. He has therefore simplified the formulas and extended the tables and has presented his new discussion to the Canadian Society of Civil Engineers, in a paper read Dec. 7, 1899.

The curve Mr. Lovelace originally proposed was the lemniscata, which was independently worked out for use as a transition curve by Mr. Charles H. Tutton (See Railroad Gazette, Aug. 4, 1893). Mr. Lovelace has made certain modifications of his formulas which greatly simplify them and make them entirely practical for field use, and he calls his new curve the modified lemniscata. But in this modification he has simply reached the true railroad spiral and has produced formulas essentially the same as those of Prof. Talbot and others.

The appearance of this paper suggests that a review of the condition of the transition curve problem may not be out of place.

Besides the method of three center curves in use on the Pennsylvania, and possibly other roads, there are two general types of transition curves in use on American railroads.

(1) The compound transition curve which is a curve composed of short arcs, usually equal, of circular curves of ever decreasing radius from tangent to curve. These usually begin with an arc of a 0° 30' curve or of a 1° 0' curve, and increase by 0° 30' or 1° 0' or other angular unit till the degree of the main central curve is reached. The arcs making up the transition curve, equal throughout any one curve, are from 10 feet to 100 feet long as may be desired or required by circumstances.

(2) The spiral, which is a curve whose radius begins with infinity and varies inversely as the length of the curve, so much of the curve being used as will bring the radius down to that of the main curve to be used. The curve may be made long or short by varying the rate at which the radius shall change. The spiral does not admit of simple mathematical discussion or easy precise location, but does admit of simple approximate demonstration and easy approximate location, and the approximations are wholly within the usual limits of precision in railroad work.

The compound transition curve does admit of precise location and simple mathematical discussion, but is not so flexible as the spiral and requires the

use of more or less extensive tables for field location, while the approximate formulas for the spiral are so simple as to need no tables at all, or at most two brief ones that can be copied on the fly-leaf of an ordinary field book.

Mr. Searles' "Railroad Spiral" is a compound transition curve, and is used on several roads. The Southern Pacific Company uses a similar curve, issuing its own tables, computed for arcs of 30 feet.

The late A. M. Wellington put into practical shape for use, the Froude curve mentioned by Rankine, and published simple tables in the Railroad Gazette many years ago. Later he elaborated his discussion in the series of articles that were to have constituted a field-book. These were published in the "Engineering News." Mr. Wellington's deductions were good so long as the angle consumed by the transition curve was small, and some of his formulas are good in any case, and it is an interesting fact that almost all of the later demonstrators of the transition curve, although going at the problem in different ways, eventually by their approximations get down to the fundamental Wellington formula of  $L = 1.86 \sqrt{\frac{O}{D}}$

or others essentially similar.

The necessity for the transition curve is now admitted by practically all intelligent engineers, but the reason for its use is stated in several ways. One says the curve is to lessen the shock incident to the sudden change of motion from tangent to curve; another that it is necessary for the proper gradual elevation of the outer rail; another admitting either or both these considerations claims as one of the greatest advantages of such curves the ready means they provide for better fitting the ground in location, since the tangents may be located to good advantage and the curves offsetted as may seem best, the transition curve covering the gap. This last consideration is likely to lead to carelessness in location in the use of too large offsets, necessitating too long transition curves. In exemplifying his formulas Mr. Lovelace uses the large offset of 27 feet with a 14° curve, necessitating a transition curve of over 500 feet. It goes almost without saying that such long curves of constantly changing radius must be nuisances to the track men. In the relining of old track no such offsets are possible, since the track must be kept on the roadbed.

The considerations which should govern in choosing a transition curve are: (1) The rate of change of direction of motion should be as rapid as is consistent with smooth riding as determined by the passenger and the track man who watches the tendency of his track to get out of line. (2) The rate of obtaining the full difference of elevation of the rails should be as rapid as is consistent with smooth riding, should be uniform, and the difference of elevation should at any point be that due to the speed and the radius at the point. This last consideration holds for the tangent, where, the radius being infinite, the difference in elevation is zero. Since smooth riding probably means a constant rate of change of elevation per unit of time, the rate of change to be assumed will theoretically vary with the speed, but practically two or three rates will suffice.

All of these considerations point to a curve that shall begin with an infinite radius or zero degree and shall vary in radius inversely as its length, and in degree directly as its length. Such is the curve of Wellington, of Halbrook, of Talbot, Crandall, Raymond and others, and practically such is the curve of those who start with some other form, as the cubic parabola or lemniscata, and making certain approximations for simplicity end with true spiral formulas. Mr. Lovelace's formulas for what he calls the modified lemniscata are essentially the same as those of Prof. Talbot, among which are the fundamental formulas of Mr. Wellington.

Most of the modern field-books contain discussions of the transition curve, which has been so simplified that there seems to be no need for new curves. Henck, Nagle, Godwin and Frost, and perhaps others, all treat of the spiral in some form, but the most concise statement of "how to lay it out" is perhaps found in Prof. Allen's new and admirable text-book on curves and earthwork. It is probably not too much to say that Prof. Talbot's little monograph, "The Railway Transition Spiral," leaves nothing to be desired in the exposition of the theory and practice of transition curves from a practical standpoint. As has been said, Prof. Allen's statement of the work in the field is a model of conciseness, Prof. Crandall shows how to write right-of-way descriptions, and Henck and Prof. Raymond show how to compute ordinates for rail-bending; but all these can be formulated by anyone who has read understandingly Prof. Talbot's book. And yet



it must be said that the formulas of Mr. Lovelace, though not so comprehensive as those of Prof. Talbot, are nevertheless, so far as they go, fully as simple. Their simplicity is largely due to the use of the length of the spiral in feet rather than in stations. They are as follows, R being the radius of the main curve, L the length in feet of the spiral, O the offset between tangent and offsetted main curve,  $\delta$  the deflection angle for the whole spiral from tangent to P. C. C.,  $\Delta$  the central angle consumed by the spiral, t the tangent distance from tangent point of offsetted main curve to the P. C. of the spiral, and C the long chord of the spiral:

$$O = \frac{L^2}{24R} \text{ common to several discussions.}$$

$$\delta = \frac{L}{6R} = \frac{40}{L} = \sqrt{\frac{20}{3R}} \text{ also common to several discussions.}$$

$$\delta \text{ in minutes} = \frac{LD}{10} \text{ where } D = \frac{5730}{R}.$$

$$t = \frac{L}{2} - \frac{5}{2} \frac{O^2}{L} \quad C = L - \frac{32}{5} \frac{O^2}{L}$$

The subtractive term is useful only with large O's.

$$\text{Deflection from P. C. to a point on spiral } l \text{ feet distant} = \delta \frac{l^2}{L^2} = \delta^1.$$

$$\text{Deflection from P. C. to a point on spiral } 2l \text{ feet distant} = 4\delta^1.$$

$$\text{Deflection from P. C. to a point on spiral } 3l \text{ feet distant} = 9\delta^1, \text{ etc., etc.}$$

Mr. Lovelace does not give formulas for deflection angles from other points than the point of spiral. The deflection at the P. C. C. from the long chord of the spiral to the common tangent is  $2\delta$  or  $\frac{2}{3}\Delta$ , and the deflection from the common tangent at the P. C. C. to any point on the spiral  $l$  feet distant is the deflection for the main curve for  $l$  feet less the deflection  $\delta^1$  for the spiral from the point of spiral to a point  $l$  feet distant, which means that the spiral departs from the main curve just as it does from the tangent.

The tangent distance from intersection point to point of spiral is best given by Prof. Talbot's formula, I being the I of Hencken and  $\Delta$  of Searles.

$$T = t + (R + O) \tan \frac{1}{2} I.$$

The tangent distance to the point opposite the P. C. of the offsetted curve is  $T - t$ , or simply  $(R + O) \tan \frac{1}{2} I$ .

Mr. Lovelace does not discuss spirals between the two branches of a compound curve, as do most writers. The simplest statement for this spiral is that it is in length and offset required between the two branches of the compound curve the same as the spiral computed for a curve whose degree is the difference of degrees of the two branches, and the spiral departs from these curves just as from a tangent and its simple curve.

The central angle consumed will be the average degree of the two branches, multiplied by the length of the spiral in stations.

The railroad spiral is, with the help of these simple formulas and directions, given in any one of several papers, little more difficult to run in than an ordinary simple curve, and the expressions given are certainly easily within the comprehension of any ordinary transit man. It will doubtless be but a short time before the use of the spiral will be universal.

The explosion of dynamite at Ashley, Pa., on the night of Jan. 25, which was briefly reported in the Railroad Gazette last week, proves to have been a costly and troublesome disaster. Dozens of houses were left without windows and the zero weather of the following day caused much suffering, as it was impossible to close all the window openings for some time. The apothecary shops had many bottles broken. At Nanticoke numbers of dwelling houses were so shaken that doors could not be closed. The total number of fatalities was six. Local newspapers complain that dynamite is habitually handled without sufficient care. Large quantities of it are used in the mining regions, and familiarity appears to breed contempt. The Mauch Chunk Times says that carloads of dynamite are allowed to stand for hours near buildings in the thickly settled part of the town; and asks why such a dangerous load should not be moved in a train by itself. It would appear that this last point is well taken, for the train which became uncontrollable was a long one and the grade was steep, conditions producing the maximum of risk in train running. Indeed, the testimony given before the Coroner, as reported in the Wilkesbarre News, indicates an unusual lack of precaution. The conductor testified that he had run over this division only four times before this trip. The train consisted of 17 loaded and 28 empty cars, and the car of dynamite was next to the engine. The grade falls at the

rate of 96 ft. to the mile and after the speed began to seem somewhat unusual the conductor asked the hind end man if it was customary to drop the train down the hill at the speed they were then going. "No," replied the brakeman, "the train has got the best of the boys." The engineman appears to have had control of three cars by means of the air brake. A light rain had been falling, so that the rail was somewhat slippery. The two brakemen on the forward portion of the train appear to have been experienced men; and the engineman called for brakes as soon as he saw that the speed was getting beyond control; but in consequence of the length of the train and of a high wind blowing, the whistle signal was not heard at the rear end of the train, and the two men in the caboose appear not to have deemed it necessary to take part in the braking until it was evident that the middle man and the front end man could not control the speed. As to the propriety of placing a car of dynamite next to the locomotive, the rule in the code reported to the American Railway Association in 1894 requires inflammable and explosive goods to be placed at least four cars from either end of the train, explosives to be placed, preferably, in the middle of the train.

New York wholesale merchants are now complaining of advances in freight rates to the Southern States; and if we were to judge by the length of the interviews printed in the Journal of Commerce, we should have to conclude that the grievance is nearly as bad as that which was presented to the Trunk Line Association. There are not so many complainers, but each one easily succeeds in filling a column of the Journal of Commerce in telling of his injury, as was the case in the earlier affair. The number of words in a complaint is not, however, the true criterion. The most prominent complaint against the southern roads is that by their new classification, just adopted, all articles are to be charged 30 per cent. above the usual rate unless the shipper signs a release. That is to say, the companies now extend to all shipments, of any and every kind of goods, the "owner's risk" condition which heretofore has been applied only to live animals, fragile goods not suitably packed, fresh fruit and suchlike things, the transportation of which is attended with abnormal risks. As the actual risk of damage, in 999 cases of a thousand, is not anywhere near 30 per cent. above a reasonable transportation rate, it must be that somewhere from 75 to 99½ per cent. of this additional price is in the nature of a penalty; an arrangement to induce shippers to bear their own risks. As a considerable share of the damage claims presented by shippers (or consignees) always turn out to be invalid, being made under a misapprehension as to the liability of the carrier, we may say that the 30 per cent. is charged for the purpose of reducing the work of investigating unfounded claims. It is hardly necessary to say that if the shippers have the fighting qualities and the hold on Legislatures that their fathers had, they will not put up with this. The enforcement of the new rule probably would not peculiarly injure the customers of the southern railroads a tenth of one per cent. on the business done; but that is not the issue. There is an apparent injustice; and in freight rate discussions the question of real injustice is, in such a case, a secondary matter.

Of course, the 30 per cent. grievance is not the only trouble; it is the one on which the largest number of men are agreed. There are many complaints concerning individual commodities, and a conference is to be held at which the New York shippers will explain the reasons for their demands. A peculiarity of the complaints concerning some commodities shipped from New York is that the competition, whether between rival sellers or rival carriers, is confined to only a few cities; so that there is some hope of negotiating intelligently. The shippers can tell pretty well how their business will be affected by advances in the rates charged to themselves or by reductions in those paid by their competitors; and the railroads can make rational estimates of the probable influence on the course of the traffic. This is a comparatively happy condition, as compared, for example, with that of the lumber dealers. Changes in freight rates on lumber have been very small as compared with the changes complained of at New York; and yet the disturbance of business appears to be quite serious. On this point the American Lumberman says:

"There has been such a shifting of freight rates within the past three months that lumbermen have hard work to figure out the basis on which they shall make delivered prices to any given territory. Successive advances by different roads and in different sections, effective December 15, January 1, January 15 and February 1, together with the later suspension of some of these new rates, have caused this mix-up. In a general way it is understood that freight rates on lumber have been advanced from one to three cents a hundred, though it is said there are some rates, notably from Wisconsin territory to Illinois and Indiana points, which have not been disturbed. With a uniform advance by all lines there would have been no disturbance in the relations of different sections as bearing on common territory, but as matters now stand there is considerable kicking in certain markets that claim to have been discriminated against. Retail dealers and to a large

extent the wholesalers also, are protesting against any general advance, but the main trouble will come through readjustment of old differentials."

A uniform advance by all lines is, probably, entirely out of the question. The grocers, oyster-shell dealers and shippers of yacht knees K. D. who are making such a loud complaint in New York should take a lesson from the Chicago lumber merchants. In actual money damage the lumbermen are probably the worse off; but they see that a score of railroads cannot act as one single body and, therefore, their complaint is modestly stated.

#### NEW PUBLICATIONS.

**Indicator Diagrams: A Treatise on the Use of the Indicator and Its Application to the Steam Engine.** By Prof. W. W. F. Pullen of the South Western Polytechnic, England. Octavo, cloth, 238 pages, 261 engravings. Manchester, England: The Scientific Publishing Company, 1899. Price 6 shillings net.

This book is arranged on about the same plan as other books lately published on the steam engine indicator, but treats the several topics somewhat more fully. Different makes of indicators are described, among which are several continuous and integrating indicators, very full explanations of which are given. In the same way there is a chapter on indicator rigs and reducing gears. The discussion of calibrating indicator springs is based on the results of experiments made by Professors Carpenter and Jacobus in this country; many diagrams are shown to illustrate how different things may affect indicator diagrams and cause errors. There are chapters on the admission and steam lines, exhaust and compression lines, valve chest and steam pipe diagrams, adjustment of valves from indicator diagrams, pump and gas engine diagrams, methods of combining and analyzing diagrams from compound engines, measuring areas and computing the efficiency of engines. An appendix contains tables of the properties of steam and the circumference and areas of circles. The book has an index.

**Air Brake Catechism and Instruction Book on Handling the Automatic Brake: A List of Examination Questions for Enginemen and Trainmen.** By Mr. Clinton B. Conger. Pocket size, 4¼ x 6¼ in., cloth, 163 pages and index, numerous engravings. New York: Locomotive Engineering, 1900. Price, 75 cents for single copies, or 60 cents each in orders of ten or more.

This is a revised and enlarged edition of a small book, of the same name, which Mr. Conger prepared while Traveling Engineer for the Chicago & West Michigan; the sales of the first book amounted to something like 24,000. In the new edition the construction, operation and defects of 8 and 9-in. air pumps are included, descriptions and engravings of recent apparatus have been added, and the examination questions and answers for enginemen and trainmen have been extended and carefully revised to suit present practice. There is also given the revised list of the air brake and signal instructions of the joint committee of the Master Car Builders' and Mechanics' Association. The book is intended as an aid to enginemen and trainmen on roads having air brake instruction cars, while for roads that do not provide such instruction the book is of the greatest value.

**Cornice Work Manual.** By S. P. Johnson. Octavo, cloth, 234 pages, 184 engravings. Chicago: The American Artisan Press, 1900.

This book is compiled from articles published at various times in the "American Artisan," and is intended for sheet metal workers. It is said that the only work treating of the subject was published about twenty years ago, during which time practice has undergone many changes. There are chapters on cornice workers' tools and drawings, estimating, measuring of surfaces, the development of various patterns, bracings and fastenings of cornices to buildings, staging and scaffolding, ornamental stamping machines, the management of ropes and hoisting tackle, and slating and slating tools.

#### TRADE CATALOGUES.

**Handbook and Illustrated Catalogue of Engineers' and Surveyors' Instruments of Precision.** Boston: C. L. Berger & Sons, 9 Province Court, 1900. Price 60 cents.

The 1900 catalogue of Messrs. Berger is an octavo volume in stiff boards, of 212 pages, including an index. It shows a great variety of instruments, not only transits, theodolites, etc., adapted to the uses of the railroad engineer, the mining engineer and the topographical engineer, but it shows astronomical attachments for field instruments as well as transits and alt-azimuth instruments and equatorial telescopes for fixed or semi-fixed astronomical observatories. Sextants and various minor engineering instruments are also shown. Among recent minor improvements is a bracket for mounting transits or levels in mines. This is arranged to screw into a post and it carries a collar on which the instrument may rest, in positions where it would be inconvenient to put a tripod. These mining instruments are also provided with a short focus lens attachment which permits focusing objects nearer than the range of the main telescope will allow. By this arrangement objects two feet from the instrument can be



focused. A couple of pages show parts of instruments made of aluminum bronze, or of aluminum alloyed with a very small percentage of copper or silver. By the use of the latter metal some saving in weight is secured, amounting in the case of a tripod head for plane-table to four pounds. The volume, besides descriptions of the instruments shown, has some excellent remarks on the construction, care and adjustment of various instruments. There are also chapters on the special uses of the solar attachments.

**Machine Tools.**—The Hilles & Jones Co., Wilmington, Del., have issued under date of Jan. 1, 1900, a new catalogue of machine tools, being catalogue No. 6. They say that the continual demand for heavier and more effective machinery has necessitated extensive remodelling of standard patterns and the addition of new tools. "To persons familiar with our No. 5 catalogue, issued in 1893, these changes will be apparent." The catalogue shows punches and shears, coping and notching machines, rail straightening press, plate planers and binders, milling machines and other machines and tools. The company is well prepared to fill foreign orders, being much accustomed to that kind of business. As our readers know, this concern makes standard machines of great capacity, as, for instance, a double punch or shear with 72 in. depth of throat and one with 18 in. throat to punch three inches in diameter through material two inches thick. Of course special designs are supplied to order.

**Pictorial History of the Locomotive.** Compiled by William Wright and issued by the Chicago Pneumatic Tool Co., Chicago.

The locomotives shown by outline drawings and very briefly described in this volume begin with Cugnot's locomotive of 1771 and end with an American compound consolidation locomotive of 1899 and an English four-coupled express locomotive of the same year. We regret to say that this American example is called by Mr. Wright a consolidated locomotive and that the English locomotive is said to be of the Atlantic type, whereas it is, in fact, of the Columbia type. We have not gone carefully through the volume to attempt to test the historical accuracy of the engravings and descriptions, but judge that they are generally correct, and at any rate, the volume is very interesting. It consists of 82 pages, 11 in. x 10 1/4 in.

The Washburn Coupler Company, Minneapolis, Minn., has issued a plate showing its movable head pilot coupler, spring buffer, passenger car couplers, tender couplers and freight car couplers, with all the parts numbered to assist in ordering. All of these couplers use the same head and standard freight coupler part and can be furnished with or without head centering springs.

**Locomotive Cranes.**—The Industrial Works, of Bay City, Mich., send a new pamphlet describing locomotive cranes in capacities of from three to 50 tons. These are illustrated by engravings from photographs with descriptive letter-press. The cranes made by this company are so well known that it is not necessary to do more than to call attention to the appearance of a new catalogue.

#### The Claims of the Interstate Commerce Commission.

Mr. Walker D. Hines, Assistant Chief Attorney of the Louisville & Nashville, who published an elaborate criticism of the Cullom bill in 1898, has issued a pamphlet characterizing as misleading and incorrect the claims made by the Interstate Commerce Commission in its annual report, which has just been issued and which was summarized in the Railroad Gazette of Jan. 19, p. 36. What follows is either quoted or correctly paraphrased from the pamphlet.

Mr. Hines says that the alleged popular demand for changes in the Interstate Commerce Law is a demand which has been stirred up by the Commission itself. The Commission says that any railroad may charge for its service whatever it pleases; but "this observation, if true, could not possibly justify giving to the Commission the powers it demands. Even if such freedom from restraint exists, it would be just the same freedom from restraint which existed when the Interstate Commerce Act was adopted; after the most thorough investigations by committees and prolonged debates in Congress. It was then decided, after much deliberation, that it would be inexpedient to give to the Commission any part of the extensive powers which it now seeks, and it is notorious that the tendency of rates has continued downward, so that there is much less reason now for conferring such grave powers upon the Commission than there was when the act was originally passed."

But the assertion is not true; the Supreme Court has stated that the Commission has important powers with respect to rates, and in the report now made it appears that the courts have upheld two orders issued by the Commission during the year. Two others were not sustained, but this was because

the court found that the orders were unreasonable. It is preposterous for the Commission to assert that no public authority has efficient control over rates. In the stockyards terminal charge case the court affirmed the power of the Commission to prohibit an unreasonable rate, but found that the stockyards rate was not unreasonable. The Commission asks for greater power than the courts exercise. When a court finds that a State commission has made unreasonably low rates it simply enjoins the enforcement of those rates; it does not undertake to specify what rates shall be established for the future.

Whatever dissatisfaction exists with the present law is the result of the persistent campaign which the Commission has kept up for the last few years. Dissatisfaction, if it exists, is no indication that the public desires the radical measure asked for by the Commission. The convention in Chicago last November, which is cited as approving the Cullom bill, was participated in and actively advised by one or more members of the Commission. The Commission omits to mention that certain classes supposed to be represented at this conference have vigorously opposed the Cullom bill.

The Commission may change its arguments, but it never changes its demands. Last year it wanted more power because tariffs were disregarded and rates were fluctuating and uncertain; this year rates are more steady and criminal rate cutting has diminished; and yet, because of the co-operation among railroads which has brought about this improvement, it asks for the very same powers which it asked for last year, on the ground that there was not such co-operation. "It can be depended upon that whether discriminations flourish or disappear, and whether rates are high or low, the Commission will continue to clamor for the powers which Congress has continued to refuse to give it. . . . The synopsis of the Commission's report does not disclose a single tangible reason why any movement should be made in the direction of the radical legislation which the Commission demands. The arguments urged by the Commission have all been conclusively refuted, and, after all, this demand for additional legislation has for its only real basis the unceasing and unlimited ambition of the Commissioners."

#### TECHNICAL.

##### Manufacturing and Business.

Mr. Charles E. Morrill, after thirty-nine years' service with Valentine & Company, vanish makers, has been elected President of the company; he started as a salesman. Mr. Henry C. Valentine, who has been President, is now made Chairman of the Board of Directors.

The continued increase in the demand for pneumatic tools, made by the Chicago Pneumatic Tool Co., has necessitated an enlargement of their plants, and considerable changes are planned. The Boyer Shops in St. Louis will be removed to Detroit, Mich., where the capacity will be more than doubled. Mr. J. W. Duntley has recently purchased the plant of the Olney Metal Co. in Philadelphia. The main building is of steel construction, about 120 x 300 feet, and with the auxiliary buildings will enable the company to establish a complete plant at that place. They will remove their Whitelaw shops from St. Louis to Philadelphia, and will consolidate with them the plant of the National Pneumatic Tool Co. recently purchased, which considerably more than doubles the output of the present Whitelaw and National shops. The factories are now running day and night.

The company reports that sales for January show over 100 tools more than December, 1899. Among other recent orders they report a cable order from Japan for an air compressor, and a number of tools for ship building.

At the annual meeting of Valentine & Co., of New York, the following officers were elected: Henry C. Valentine, Chairman of the Board; Charles E. Morrill, President; Charles S. Homer, Vice-President; Leland Fairbanks, Secretary; A. Lawrence Phillips, Treasurer; Allan A. Morrill, Assistant Treasurer.

The Pittsburgh Testing Laboratory, Limited, inspecting Metallurgical Engineers and Chemists, of Pittsburgh, Philadelphia and Chicago, have associated themselves with Messrs. Chambers & Hone, Consulting Engineers, 60 New St., New York, and will hereafter be represented by them in New York, New Jersey and New England.

The wrought iron facade to surround the U. S. mining exhibit at the Paris Exposition was shipped last week from Chicago. It was designed by E. C. Fisher, of Boston, after a competitive contest, and was made by Winslow Bros. of Chicago. The inclosure is to be 162 ft. long and there are to be 11 columns of polished bronze, beside those supporting the entrance. The main gates open by lifting, and in addition there are two smaller gates leading to the iron and steel and petroleum sections.

The Railway Supply & Equipment Co. was incorporated in West Virginia Feb. 2, with an authorized capital of \$50,000, to make and deal in all railroad supplies. Among the incorporators are Wm. E. Orr, Newark, N. J.; James C. Norris, Charles G. Bacon,

Jr., James E. Heath and Emil Schneelock. Howard R. Bayne, 16 Exchange Place, New York, is the attorney.

##### Iron and Steel.

Mr. J. J. Campbell has been appointed Auditor and Assistant Secretary of the Carnegie Steel Co., Ltd.

The National Steel Co. will, about April 1, begin making standard rails at its Youngstown, O., plant. The net earnings of the National Steel Co. for the past year are stated to be \$11,000,000. The American Steel & Wire Co. has issued a circular to the stockholders stating that at the annual meeting, Feb. 20, an amendment to the charter will be brought up for consideration. This amendment is to retire, after redemption, all or a part of the preferred stock.

United States Minister Charles Page Bryan of Petropolis, Brazil, has cabled the State Department that the San Francisco Railroad requests bids on 5,000 tons of soft coal yearly. Also that catalogues of iron structures are wanted.

Despatches from London state that the Staffordshire Iron Works Co. has advanced the price of iron 10 shillings per ton.

The Pottstown Iron Co. has closed a contract to lease its plant to the Glasgow Iron Co. The latter company has been operating the Pottstown Iron Company's works for the past eighteen months.

The Carnegie Steel Co., Ltd., has a contract to furnish 3,000 tons of rails for the British North Borneo Ry., being built by English capitalists.

The Berlin Iron Bridge Co., at a meeting held Jan. 29, increased the capital stock to \$750,000. The following Board of Directors was elected: Chas. M. Jarvis, Frank L. Wilcox, S. H. Wilcox, H. H. Peck, Geo. H. Sage, D. E. Bradley and Seymour N. Robinson.

The Supreme Court has decided in favor of the Carnegie Steel Co., Ltd., vs. the Southern Ry., for a claim of \$125,000 for rails furnished the Richmond & Danville before its foreclosure.

##### Draft Gear.

The Committee of the Master Car Builders' Association on Draft Gear has sent out a circular containing the questions which follow. Mr. J. R. Slack, Assistant Superintendent of Motive Power, Delaware & Hudson Co., Albany, N. Y., is Chairman of the Committee and replies should be sent to him before March 1.

1. What is your standard form of "Draft Gear" for freight cars? Send blue prints.
2. What is cost per car for maintenance?
3. What are the weak points, if any, that you find in this form of "Draft Gear"?
4. Have you used any form of metallic draft arms—to what extent? Send blue prints.
5. What is average length of time same has been in service?
6. What is first cost of applying as compared with wooden draft arms?
7. What is cost of maintenance as compared with wooden draft arms?
8. Have you pressed steel or other form of draw bar stop besides the ordinary cast iron stop?
9. What are the advantages that you have found with such a stop over the cast iron stop?
10. Have you used a tandem or twin spring or other form different from the ordinary 6 1/4 in. x 8 in. double coil spring? Send blue print.
11. Have you found such a spring desirable to relieve the shocks in heavy trains?
12. Do you consider the 6 1/4 in. x 8 in. double coil spring of 19,000 lbs. capacity, sufficient for heavy freight locomotives of 35,000 lbs. to 40,000 lbs. tractive power?
13. Do you consider the use of draw timber keys advisable?
14. Have you made any test to determine how much of a shock of buffing is absorbed by the springs?
15. What experience, if any, in transmitting pulling strain to opposite end in place of making draft beams and center sills at same end take the strain more particularly referring to the American Continuous type?
16. What has been your experience in taking part of pulling strain by placing two rods to which coupler is fastened back to second needle beam?

##### Sand in Emergency Stops.

A patent has recently been granted to Mr. C. W. Sherburne, of the Automatic Track Sanding Co., of Boston, for the combination of an additional air port with the Westinghouse engineer's brake valve, by the use of which, at little expense for connection with the air track-sanding apparatus of any make, an automatic flow of sand to the rails is insured whenever an emergency application of the air brake is made. While it is only when rail conditions are bad that the use of sand may be desired in service applications, the use of sand is important in an emergency application of the brakes, as an additional means of securing a short stop. Under such circumstances it is an especially desirable feature that every part of the brake or stopping equipment shall be applied by one motion only on the part of the engineer. The Westinghouse Air Brake Co. will furnish this style of engineer's valve when requested.

##### The MacPherson Safety Switch and Frog.

In the Railroad Gazette of April 10, 1896, we described and illustrated the MacPherson safety switch and frog, which leave the main line rails unbroken. This device has been in use for some time on the Canadian Pacific, Grand Trunk, Intercolonial and other railroads in Canada. Recently two were applied to the main line of the Southern Pacific at West Oakland, Cal., and one to the tracks of the Chicago, Milwaukee & St. Paul at Watertown, Wis. Negotiations are now being made to apply the switch and frog to the Imperial Government Railroads of Japan, and arrangements have been practically concluded for ordering a number for the Government



Railroads in Natal and Orange Free State, South Africa, when the present war broke out. During 1899 the Canadian Pacific installed about 100 MacPherson switches and frogs to various parts of its system. The inventor and maker is Mr. Duncan MacPherson, Montreal, P. Que.

#### Railroad Material in Austria.

At a convention of Austrian manufacturers in Vienna near the close of last year it was reported that makers of rails, rail joints, etc., produced less in 1899 than the year before, because fewer new railroads were built. Locomotive works were well employed, with some small orders from foreign countries. Car works had been more steadily busy than heretofore, but not up to their full capacity, and were likely to reduce the number of their employees during the winter. The exports of cars decreased considerably.

#### British Locomotive Exports.

The value of the locomotives exported from the United Kingdom in the year 1899 was £1,468,467, as compared with £1,483,600 in 1898 and £1,006,136 in 1897. The locomotives sent to British India in 1899 reached in value a total of £762,178, being a great increase over either of the years immediately preceding. The value of locomotives sent to South America in 1899 amounted to £181,035, being about £8,400 less than in 1898.

#### THE SCRAP HEAP.

##### Notes.

Telegraph operators on the Pittsburgh, Fort Wayne & Chicago have been supplied with hoops by which they can deliver train orders to an engineman without requiring him to stop.

The number of clerks dismissed from the office of the Wagner Palace Car Company at New York in consequence of the consolidation with the Pullman Company is reported as 25.

The United States Court in Vermont has decided that the Railroad Commissioners of the state have no power to require the railroads to sell transferable mileage tickets at two cents a mile.

An officer of the Chicago, Burlington & Quincy has stated to a newspaper reporter that on all the Burlington lines the passenger cars are to be painted a dark color instead of canary yellow. All through passenger trains are to be vestibuled, and baggage and express cars are to have their steps taken off.

The Delaware, Lackawanna & Western gives notice that it will not haul any car in a passenger train which is heated otherwise than by steam; nor any car not equipped with the quick acting automatic air brake, the Westinghouse train signal and the M. C. B. coupler (or a suitable coupling hold). The road also refuses platform cars which are over 60 ft. long.

The Thrall simplex local ticket is being introduced on the Texas lines of the Atchison, Topeka & Santa Fe. In this style of ticket a single form is used for a considerable number of stations, say one-half or all the stations on a given division or in a given State, the names of the stations being printed in a column along the margin of the ticket. The cutting instrument used to separate the stub from the ticket takes off from the ticket a portion of the name of all the stations except the one to which the ticket is to be used.

It is announced that the restaurants in the stations of the New York Central are hereafter to be managed directly by the company. It appears that this will throw a number of persons and firms out of business. One firm, Johnston Brothers, has managed the dining rooms at Poughkeepsie, Albany, Rochester, Buffalo, Weehawken, Kingston and the West Shore station at Syracuse. The railroad company has recently taken the management of the dining cars on its trains and has appointed a superintendent of dining cars, who reports to the General Passenger Agent.

A Pittsburgh (Pa.) paper reports that one building in that city, the Park Building, has among its tenants 42 railroad companies, whose offices occupy 54 rooms. Only two of these offices are on the ground floor. A correspondent who sends us this note thinks that the facts indicate that Pittsburgh is but an overgrown village, with unusual railroad development. "City business," so-called, is relatively so unimportant that a city office on a prominent corner, level with the street is not deemed necessary; while yet it is necessary to have an agent in the city to visit the numerous large manufactories in that region.

The Grand Jury at Paterson, N. J., has found indictments against seven officers and employees of the Delaware, Lackawanna & Western for manslaughter in connection with the rear collision at Paterson last November, in which a number of passengers were killed. Besides the trainmen directly concerned, the Grand Jury indicts the Division Superintendent, the General Traffic Manager and the General Passenger Agent. The engine wipers, the ticket sellers and the brakeman's wife appear to have been overlooked. The report of the doings of the Grand Jury says that the evidence showed that the

foremost train had been standing 5 minutes before the collision occurred.

The Pullman Palace Car Company has paid \$2,000 on a judgment obtained in the United States District Court by a passenger who was put off from a sleeping car because his railroad ticket was not good. The passenger had a ticket from San Francisco to New York and at New Orleans bought a berth ticket from that city to New York, showing the sleeping car agent his transportation ticket. The last coupon read over the Baltimore & Ohio, but the agent sold him a berth in a sleeper which went over the Pennsylvania. After passing Washington the passenger was told that his railroad ticket was not good, but he refused to pay his fare and was put off at Baltimore. The defendant claimed that the passenger had been notified at Washington to change trains, but had refused to do so. This was denied by the plaintiff. The court held that the sleeping car company had contracted to carry the passenger through to Jersey City in a particular car and thereby warranted him that he should be allowed to ride through undisturbed.

#### The Port Richmond, Philadelphia, Terminal of the Philadelphia & Reading.

The Philadelphia & Reading recently finished at the Port Richmond freight station, on the Delaware River, two large piers and has doubled the capacity of a third, and increased the capacity of the grain elevator. The station occupies about 140 acres and contains 75 miles of track. The piers have a capacity for 1,200 cars of freight, and there are berths for ten ocean steamers, with a depth of 27 ft. at low tide. The William Street station, pier A, is now the largest terminal on the Delaware River, being 700 ft. long and 170 ft. wide, with corrugated iron shed and a storage capacity of 700 cars. Adjoining this pier, and also pier C, used by the Cosmopolitan Line, is the Port Richmond elevator, the storage capacity of which has been increased to 1,500,000 bushels. This elevator is equipped with modern appliances for discharge of grain from cars and loading into vessels. Thirty-two cars can be unloaded simultaneously. The steamers of the Philadelphia Transatlantic Line and the Cosmopolitan Line are loaded directly alongside the elevator. Pier C, used by the Cosmopolitan Line, is 646 ft. long and 150 ft. wide, with a storage capacity of 500 cars. At pier G a 50-ton movable crane, operated by electricity, is being placed to facilitate the handling of iron ore, heavy machinery, lumber, etc. The Hamburg-American Line sails from the P. & R. piers, 24 and 25. The Philadelphia Transatlantic Line is managed by Charles M. Taylor's Sons. Four vessels of 8,000 tons each are being built to be put in commission during this year.

#### A Big "Train."

A press dispatch from Cincinnati states that on the morning of January 26 the steamboat Joseph B. Williams started from that city for New Orleans hauling a fleet of 42 boats, each containing 1,000 tons of coal. Thirty of these boats came from Pittsburgh and the rest were added at Cincinnati. At Louisville 10 more boats were to be added, making about 50,000 tons of coal moved by one propelling machine. This quantity would require 1,000 of the largest modern cars, or, say, 2,000 cars—25 to 50 trains—of the prevailing capacity ten years ago. It is true that a load of this magnitude would strain the tug just a little harder if the movement were upstream instead of downstream; but it is a significant object lesson in transportation nevertheless.

#### New York Bridges.

A bill taking out of the hands of New York City authorities, the construction of bridges and tunnels over the East River, connecting the boroughs of Manhattan and Queens, and giving the control of them to the Governor of the State, has been favorably reported by the Assembly Committee on Commerce and Navigation. The bill provides for the appointment of a bi-partisan commission of six by the Governor to take charge of the work. The following work is proposed by the bill:

First—A bridge over the East River connecting the boroughs of Manhattan and Queens.

Second—A bridge over the East River connecting the boroughs of Manhattan and Brooklyn at a point between the present bridge and the new East River Bridge now building.

Third—A tunnel under the East River from the foot of Whitehall St. in the Borough of Manhattan, to the vicinity of Hamilton ferry, in the Borough of Brooklyn.

Fourth—A tunnel under New York Bay from South Brooklyn to Clifton, N. J.

The bill requires the New York City authorities to turn over all plans, maps, papers, etc., for the proposed bridges to the commission to be appointed by the Governor.

#### To Straighten the Miami River, O.

A bill has been passed by the House of Representatives authorizing \$135,000 bonds to be issued by the Commissioners of Montgomery County, O., for straightening the Miami River.

#### Fire Protection.

A fire which destroyed the large spice mill adjoining the Chicago public library on Feb. 2 furnished the first opportunity to test the apparatus for covering the library building with a curtain of water. Tubes are arranged around the outside of the building at the top, through which water can be turned, and it is said that the arrangement proved satisfactory. Streams of water poured out of the tubes, covering the walls and coating them with ice in a few minutes.

#### Pintch Gas at the Boston South Station.

A plant for the manufacture of Pintch gas for use in cars has been established on the terminal grounds, capable of making 120,000 cu. ft. of gas daily. A building 110 ft. long and 40 ft. wide, two stories high, has been constructed on pile foundations; and in this building there have been installed 40 retorts and the accompanying furnaces, three engines and compressors for compressing the gas, purifiers, meter, feed tanks, drip and tar pumps, and all other necessary appliances. Outside of the building are installed two oil storage tanks, a tar tank, 10 store holders and a gas holder 30 ft. in diameter and 15 ft. deep. A main pipe leads from this plant, connecting with distribu-

tion pipes to 120 outlets in the train shed and about 20 more outlets in the express yard, where gas can be put into the car tanks through hose connections. The cost of this entire gas plant, including the building, is about \$80,000.

#### Some of the Conveniences of a Modern Station.

In Mr. Francis' admirable paper on the South Terminal Station at Boston, printed in the December Proceedings of the American Society of Civil Engineers, he mentions some of the minor conveniences of that very well equipped station as follows:

A private telephone exchange for the terminal only. Separate ticket-selling booths for each man. A liberal number of weighing scales in baggage rooms and express buildings. Ample bicycle racks, check racks, etc. Checking system to care for trainmen's coats, hats, etc., instead of the usual lockers. Kitchen and restaurant furnishings. Booths for weighers at scales in express buildings. Apartments for car inspectors. Train mail-chute and sorting room. Speaking tubes. Case for sale of emergency articles, rubbers, umbrellas, etc., in women's room. Shoe-cleaning and polishing chair in women's room. Room for police squad at the station. Dressing room for porters and gatemen. Conveniences for handling newspapers. Carpenter and paint shop for repair men. Blacksmith shop for interlocking and track work. Shop for small repairs to machinery and piping. Stock room, oil house, lamp room, trackmen's tool room, yardmaster's office, trackmasters' headquarters and interlocking supervisor's room, storage yard for spare track material.

To these we may add locked water closets, for men or women, opened for a fee of five cents, and special lavatories and closets on the second floor for the use of those who go to the restaurant. Further, one should note the remarkable tidiness of the whole station and the unusual civility and the well-dressed and well set-up air of all the attendants.

#### Forty-five Mile Power Canal.

Dispatches from Fremont, Neb., state that work has been begun on the Fremont-Omaha Canal, a waterway for power purposes between these two cities, a distance of 45 miles. It is estimated that \$2,000,000 will be spent on the work. A dam about 200 ft. high will be built at Omaha. A suburban electric railroad is proposed to parallel the canal.

#### The Havana Dry Dock.

The Havana Dry Dock Company, which is building the \$400,000 dry dock at Havana, Cuba, has let several contracts. The Riter-Conley Manufacturing Company, of Pittsburgh, and the Carnegie Steel Company will supply the steel work. The Manhattan Construction Company of New York will build the piers, the lumber being supplied by Chas. Hirsch & Co. The contract for heavy machinery is being filled in Havana by the Havana Iron Works.

#### Chicago River and the New Canal.

Since the opening of the Drainage Canal navigation interests have complained that the increased current in the Chicago River, which is now very rapid at some points, and the lowering of the level of the river are a menace to navigation, although the full flow required by law is not yet passing through the canal. At a meeting of the Trustees of the Sanitary District, Jan. 31, some members of the board said that the current exceeds 1½ miles an hour, which is the limit fixed in the permit of the War Department for the opening of the canal. At this meeting the trustees passed a resolution directing the Engineering Committee to investigate the velocity of the current in the Chicago River, and if the current at the center pier bridges is found to impede navigation to report the points at which such obstruction exists, and give an estimate of the cost of removing the center pier bridges and building bascule bridges to replace them.

Representatives of the shipping, lumber, elevator, dock, railroad and towing interests demand that the Sanitary District maintain the depth of water in the river which existed before the Drainage Canal was opened. The river is now several inches lower than formerly and boats have scraped over the tops of the street railroad tunnels.

A joint meeting of the Trustees of the Sanitary District, the River Improvement Association and city officials considered the problem, and it was tacitly agreed that the Sanitary District should remove the center pier bridges, that the street railroads must lower the tunnels and that the Government would then be willing to dredge the river.

#### Ice and Elevated Railroads.

On Saturday evening, Feb. 3, there occurred in Chicago the first storm in two years which has affected traffic on the elevated roads. Snow was preceded by sleet which coated the rails with ice and caused a blockade between 11 P. M. and 5 A. M. on the Lake Street Elevated; the other elevated roads kept trains running with only minor delays. The tracks of the surface roads were kept clear and the regular service was maintained.

#### Flange Wear.

At the January meeting of the St. Louis Railway Club Mr. T. S. Kelly said: "The Western Railway Club had this issue up for discussion in 1890. It was brought out that out of 632 pairs of wheels removed in six months on the I. C. Ry. at Chicago, only 11 were removed for flange wear, this road using swing bolsters exclusively. Mr. Barr held that four-fifths of flange wear was due to the difference in size or quality of mated wheels, and one-fifth was due to the trucks. Mr. Barber stated that tests showed that the flange wear was 20 per cent. in favor of the swing beam truck. As to the reasons for the great adoption of rigid bolster trucks, I think flange wear has had very little consideration in such adoption. The rigid truck was adopted for the reason that it could be constructed of fewer parts. Probably there is so little difference in the amount of flange wear directly attributable to type, in either class of trucks, that lower first cost and maintenance of the rigid truck proves it to be the most economical, all things considered."

#### Railroad Material in French Indo-China.

The Governor-General of Indo-China has forwarded a proposition to the French Minister of Colonies, in which it is proposed, in conformance with the law of December 25, 1898, to at once proceed with a portion of the work authorized in that bill, building a railroad from Hanoi to Vinh and from Hanoi to Vietri. The proposition has received the approval of the President of the Republic. The



first-named line will be 199 miles in length, and the last-named 96½ miles. The total cost of the two is estimated at about \$10,000,000. Although the policy of the French Government stipulates that only French-made material be used; it is understood that this will be out of the question in the case of the new lines. The proper person to address is the Minister for the Colonies, Paris.

The railroads of French Indo-China are of no great importance, there being few lines in operation, namely, the State line from Saigon to Mytho, 43.5 miles in length (meter gage) operated by the Cie. Général des Tramways à Vapeur de la Cochinchine, Boulevard de Sébastopol, Paris; the railroad from Hongay to Hatow and Nagatna, 7.5 miles (meter gage) running 2 locomotives, 2 passenger cars and 30 freight cars (the Manager is Mr. R. Brossard, Nagatna), and the State Railway Phu-Lang-Chuong to Langson, 63½ miles long (gage 1 ft. 8½ in.) with ten engines, 27 passenger cars and 72 freight cars (Mr. Borrell, Engineer, Langson, being the Manager).

#### Traffic Notes.

The Grand Trunk Railway announces that flour shipped to Montreal, to be held there until the opening of navigation, May 15, will be stored at two cents a barrel.

Toronto papers report that in consequence of heavy advances made in freight rates by the railroad, certain merchants of that city are now carrying their freight between that city and Hamilton, about 40 miles, on wagons.

Members of the Chicago Board of Trade who deal in grain on a small scale, and who claim that the favors granted by the railroads to large dealers have destroyed their business, have presented a complaint to the Interstate Commerce Commission, and Commissioner Fifer has been to Chicago to investigate it.

Press despatches report that the Southern Pacific and the Rio Grande Western have made arrangements with their eastern connections, under which the Burlington and the Rock Island will run through sleeping cars between Chicago and San Francisco.

The disagreement between Eastern and Western roads concerning through billing and prorating to and from points beyond the Mississippi River appears to be still unsettled, but a Chicago despatch states that the Indiana, Illinois & Iowa has succeeded in making an agreement with both its Eastern and its Western connections, which would seem to indicate that the project of the Eastern roads would not succeed.

Press despatches from Chicago continue to affirm that grain rates to the Atlantic seaboard have been secretly cut five cents and more, but it is stated that the Eastbound Freight Committee has held a meeting and that it was decided that all tariffs should be restored on Feb. 11. Most of the blame has been laid at the doors of Nickel Plate and the Grand Trunk. It appears that there have been similar cuts on flour from Minneapolis.

It is stated that the proposition to physically pool the passenger business between Chicago and St. Paul has been abandoned because the demands of the different roads aggregated a good deal more than 100 per cent. The Chicago, Milwaukee & St. Paul demanded 40 per cent. It is said that the percentages carried by the different roads for the six months ending March 31, 1899, were as follows: Burlington, 13.91% (allowed 13.40%); Chicago Great Western, 16.04% (allowed 13.50%); St. Paul, 31.24% (allowed 30.33%); C. & N. W., 22.54% (allowed 22.52%); Albert Lea, 3.49% (allowed 6.45%); Wisconsin Central, 12.78% (allowed 13.30%).

The County Court at St. Paul, Minn., has issued a mandamus requiring the St. Paul & Duluth and the Minneapolis & St. Louis railroads to continue to give to the public the joint through rates for the transportation of coal from Duluth to points south of St. Paul, which were established by the State Railroad Commission some months since. It appears that one or both of these roads deemed the Commission's rates too low, and to avoid carrying the coal at the low rates they abrogated the through tariff from Duluth; at the same time establishing a through rate from Superior, Wis., which afforded practically the same accommodations to the traffic and took the business out of the jurisdiction of the Minnesota authorities.

The Merchants' Association of New York City, which was one of the principal complainants before the Trunk Line Association and which has also protested against the advances in freight rates, recently announced by the railroads of the Southern States, is sending an equally strong protest to the roads west of Chicago, which adopted changes in classification soon after the Trunk lines. The most important objection to the western classification is that rates for mixed carloads have been discontinued. This change will throw large numbers of shipments into the L. C. L. class which otherwise would have gone at carload rates. One of the protests presented to the Trunk Line Association avers that there is discrimination in the shipments of merchandise from the West to the Atlantic seaboard which is to be exported. Such freight, when in carloads, is lightered at New York free, but it is charged that on the shipments of certain favored parties free lighterage is also given to small shipments, the railroads sometimes going so far as to deliver each separate lot to a different export vessel. A committee of the National Association of Manufacturers claims that under the new tariff the favored parties will have a still greater advantage over the general public.

#### Chicago Elevated Railroads.

The South Side Elevated traffic statement for January shows that the number of passengers carried during that month was 2,154,624, a daily average of 69,504. This is an increase of 10,742 a day over January, 1899. The Metropolitan Elevated traffic in January shows an increase of 22.5 per cent. over January, 1899.

#### Technical Schools.

University of Wisconsin.—Mr. H. G. Prout, Editor of the Railroad Gazette, will deliver a lecture before the engineering students of the University of Wisconsin on Friday, Feb. 16.

#### The Siberian Railroad.

The weekly express train (starting from Moscow) over the Siberian Railroad is so well patronized of late that it is proposed to run it two or even three times a week soon. The journey from Moscow to

Irkutsk is made in nine days. The rails are now laid on what is called the Trans-Baikal section of the railroad, from Lake Baikal opposite Irkutsk eastward to a branch of the Amoor River at Sretensk, which latter place is a little east of the junction with the Chinese Eastern Railroad, and will probably be the permanent terminus of the Siberian Railroad proper. The Amoor is navigable for river steamers of light draft below Sretensk, and lines of sleighs run over it in winter; and as there is an extremely small population in the valley, and the Chinese road will be infinitely superior as a through route, the continuation of the line down the Amoor is not needed.

#### Funds for Rivers and Harbors.

The Chief of Engineers has reported to the House Committee on Rivers and Harbors the funds available on Jan. 1 for river and harbor work. The larger items include the following:

Harbor at Duluth, Minn., and Superior, Wis....	172,176
Water way across Keweenaw Point, from Keweenaw Bay to Lake Superior.....	296,307
Hay Lake channel, St. Mary's River.....	100,000
Harbor of refuge at Sand Beach, Lake Huron....	147,634
Detroit River.....	100,000
Chicago River.....	238,284
Chicago harbor.....	103,953
Illinois and Mississippi Canal, Illinois.....	1,033,703
Toledo harbor.....	129,069
Cleveland harbor.....	391,623
Fairport harbor.....	120,535
Harbor at Buffalo.....	798,204
Mississippi River from Ohio River to Missouri River.....	493,154
Mississippi River from Missouri River to St. Paul, Minn.....	614,544
Mississippi River from St. Paul to Minneapolis..	187,405
Reservoirs at headwaters of Mississippi River..	145,246
Missouri River between Stubbs Ferry, Mont., and lower limits of Sioux City, Iowa.....	116,935
Ship canal, connecting waters of great lakes between Chicago, Duluth and Buffalo.....	447,579
Mississippi River, head of passes to Cairo.....	781,840

#### Garbage Disposal at Chicago.

A garbage crematory with a capacity of 30 tons a day has been built at the Chicago "Bridewell" for the disposal of the garbage of that institution. It is now proposed to enlarge the plant so as to dispose of the garbage of the entire city and to collect the garbage by barges on the Chicago River. The idea is to place barges at the street ends on all branches of the river to be used as dumps.

#### 124 Miles an Hour.

The German Society of Mechanical Engineers offers a prize for designs of a terminal station suitable for an electric railroad, having numerous through trains running at a speed of 200 kilometers (124 miles) an hour. The problem is put for the purpose of securing a serious study of one of the many questions involved in the use of train-speeds far beyond any now practicable. It is further desired to have a study of the problem of starting and stopping trains, running at the above speed.

#### American Car & Foundry Company.

The American Car & Foundry Company issues a statement under date of Feb. 1 saying that the gross earnings for the nine months ending Nov. 30 last amounted to \$29,272,908. The net earnings for the nine months amounted to \$2,717,413. Dividends were paid on \$29,090,000 of capital stock (issued) to the amount of \$1,527,225.

#### Santa Fe.

Coaches from all the branches of the Santa Fe system are being sent to the shops to have the lettering changed. All cars will bear the name "Santa Fe" on the letter board, and the initials of the particular branch to which they belong below the number. A good plan. People travelling on the Santa Fe have waked up to find that they were on the Atlantic & Pacific, Santa Fe Pacific, the Southern California Ry., or the San Francisco and San Joaquin Valley Ry.

#### Isle of Man Electric Railroads.

The very popular and extensive system of trolley lines in the Isle of Man has undergone an interesting alteration. The steam-driven plant for the Douglas-Laxey & Ramsey lines has been shut down, and the whole 18 miles of railway is now operated from a water-power plant. There are two Victor turbines developing 140 H. P. The Laxey River is the force utilized.

#### A Railroad to Bagdad.

French papers have recently published the text of a preliminary agreement signed Dec. 3 at Constantinople for a railroad concession under the title of the Bagdad Railroad. The convention is between the Minister of Commerce and Public Works and Dr. von Siemens, President of the Council of the Ottoman Railroad Company of Anatolia. This latter company agrees to build a railroad to Bagdad and Bassorah within eight years, the railroad to start from Korriah. The company will proceed at once to make the necessary surveys and studies and to submit its plans and estimates to the Turkish Government. The company must undertake not to transfer its concession to any other company, while the Turkish Government reserves the right to buy the line at any time. Measures have been taken to admit people of various nationalities into the enterprise; that is, it is said that the cost of construction and the profits of working will be divided as follows: Forty per cent. French, 40 per cent. German and 20 per cent. to be divided between the Belgians, Austrians and Swiss.

#### LOCOMOTIVE BUILDING.

The St. Louis Southwestern is considering buying five locomotives.

The South Manchester has ordered one locomotive from the Baldwin Locomotive Works.

The Chicago Great Western has, we understand, asked bids on six passenger and 10 freight locomotives.

The Chicago, St. Paul, Minneapolis & Omaha is considering ordering this month six or eight locomotives.

The Intercolonial will, it is reported, order five mogul passenger and five consolidation freight locomotives.

The Hocking Valley is said to have ordered eight more consolidation locomotives from the Brooks Locomotive Works.

The Chicago, Lake Shore & Eastern, and not the

Elgin, Joliet & Eastern as reported last week, is considering buying five locomotives.

The Atchison, Topeka & Santa Fe is preparing plans for 10 consolidation locomotives to be built at its Topeka shops and used as pusher engines.

The Pittsburgh & Lake Erie is said to have ordered 15 heavy locomotives from the Pittsburgh Locomotive & Car Works. We have no official information.

The Gulf, Beaumont & Kansas City has ordered three engines from the Cooke Locomotive & Machine Co. They will be 10-wheelers, with 18 in. x 24 in. cylinders.

The Detroit & Mackinac has ordered from the Baldwin Locomotive Works the two engines referred to Jan. 26. They will be 10-wheelers with 18 in. x 24 in. cylinders, duplicates of two built for the road last year.

The Union Pacific is not considering new locomotives as reported last week. We are officially informed that no new locomotives are under consideration beyond those ordered some time ago from the Baldwin Locomotive Works.

The Pittsburgh & Lake Erie has not recently ordered locomotives from the Pittsburgh Locomotive & Car Works as reported last week by a contemporary. The locomotive works are now working on an order for 10 consolidation engines for the Pittsburgh & Lake Erie, ordered last fall.

The Mexican Central has ordered six consolidation engines for July delivery from the Rhode Island Locomotive Works. They will weigh 180,000 lbs., with 160,000 lbs. on the driving wheels and have 21 in. x 26 in. cylinders; 55 in. driving wheels; Belpaire boilers with 374 charcoal iron tubes 2 in. in diam. and 11 ft. 15-16 in. long, and a working steam pressure of 180 lbs.; fireboxes, 121 in. long and 38½ in. wide; and a tender capacity for 4,500 gals. of water and eight tons of coal. The specifications call for Westinghouse brakes, Player metallic brake beams, 18 in. round headlights, Friedman non-lifting injectors, Crosby 3-in. pop safety valves, Nathan triple sight-feed lubricators and Crosby steam gages.

The Seattle & International order, referred to last week, was placed with the Schenectady Locomotive Works and calls for two consolidation engines for March delivery. They will weigh 130,000 lbs., with 116,000 lbs. on the driving wheels and have 20 in. x 24 in. cylinders; 51 in. driving wheels; wagon top boilers with 275 charcoal iron tubes 2 in. in diam. and 12 ft. 6 in. long, and a working steam pressure of 180 lbs.; fireboxes, steel, 104 in. long and 42½ in. wide; and a tender capacity for 4,000 gals. of water and eight tons of coal. The engines will be furnished with Westinghouse brakes, Tower couplers, Monitor injectors, Jerome piston and valve rod packings, Ashton safety valves, Leach sanding devices and Nathan lubricators.

The Colorado & Southern order with the Rhode Island Locomotive Works, referred to last week, calls for five 10-wheel engines for delivery in June and five consolidation engines for delivery in July. The former will be exact duplicates of those described in this column for the Fort Worth & Denver City. The consolidation engines will weigh 166,000 lbs., with 148,000 lbs. on the driving wheels and have 21 in. x 28 in. cylinders; 56 in. driving wheels; straight boilers with 306 Tyler charcoal iron tubes 2 in. in diam. and 13 ft. 6 in. long, and a working steam pressure of 190 lbs.; fireboxes, 114 in. long and 41½ in. wide, of Carbon steel; and a tender capacity for 5,500 gals. of water and 10 tons of coal. The special equipment will be the same as for the Fort Worth & Denver City engines.

The Fort Worth & Denver City order with the Rhode Island Locomotive Works for three 10-wheel engines, referred to last week, calls for engines to weigh 152,000 lbs. with 118,000 lbs. on the driving wheels, for July delivery. They will have 20 in. x 26 in. cylinders; 63 in. driving wheels; extended wagon top boilers with 294 Tyler charcoal iron tubes 2 in. in diam. and 13 ft. 4 in. long and a working steam pressure of 200 lbs.; fireboxes, 120 in. long and 42 in. wide, of Carbon steel, and a tender capacity for 5,500 gals. of water and 10 tons of coal. The specifications call for New York air brakes, hammered iron axles, Rhode Island Locomotive Works brake beams, Sargent combination brake shoes, Standard couplers, 18-in. round case headlights. Monitor injectors, Jerome piston and valve rod packings, Crosby safety valves, Leach sanding devices, Nathan lubricators, Scott springs, Latrobe driving wheel tires and Standard steel tired truck and tender wheels.

The Burlington, Cedar Rapids & Northern last year gave an order to the Brooks Locomotive Works for 20 locomotives. Ten of these are to be delivered by June 1, and the remainder during the year, as may be decided by the road. Those now under way are five 10-wheel express freight and five 6-wheel switching engines. The former will weigh 149,000 lbs., with 115,000 lbs. on the driving wheels, and have 20 in. x 26 in. cylinders with B. L. W. improved piston valves; 57 in. driving wheels; Belpaire boilers with 308 charcoal iron tubes 2 in. in diam. and 13 ft. 2¼ in. long and a working steam pressure of 200 lbs.; fireboxes, steel, 113 in. long and 41-3-8 in. wide; and a tank capacity for 4,500 gals. of water. The switching engines will weigh 106,000 lbs. and have 18 in. x 24 in. cylinders; 51 in. driving wheels; straight top boilers with 202 charcoal iron tubes 2 in. in diam. and 11 ft. 1 in. long and a working steam pressure of 165 lbs.; fireboxes, steel, 84 in. long and 33 in. wide; and a tank capacity for 3,000 gals. of water. The 10-wheel engines will have Monitor and Ohio injectors, Jerome piston rod packing, B. L. W. special valve rod packing, and driving wheel centers of cast steel made by the Pratt & Letchworth Co.; the switchers will have Nathan and Ohio injectors, Jerome piston and valve rod packings and cast iron wheel centers. Both types will have Westinghouse brakes, M. C. B. couplers, Leach sanding devices and French springs.

#### CAR BUILDING.

The Atchison, Topeka & Santa Fe is in the market for 2,500 stock cars.

The Philadelphia & Reading is reported as getting prices on 100 refrigerator cars.

The Pennsylvania has, it is stated, ordered 40 passenger cars built at its Altoona shops.



The H. J. Heinz Co., Pittsburgh, is considering ordering 25 refrigerator and six tank cars.

The Omaha Packing Co., South Omaha, Neb., is figuring on ordering 150 refrigerator cars.

The St. Paul & Duluth is receiving bids on 100 flat cars of 80,000 lbs. capacity, to measure 40 ft. long.

The Davenport, Rock Island & Northwestern is about to order 20 flat and about five passenger cars.

The Vandalla is reported as getting bids on from 1,000 to 2,000 Class G k coal cars of 80,000 lbs. capacity.

The Chicago, Kalamazoo & Saginaw has ordered one passenger car from the Barney & Smith Car Co.

The Chicago, Milwaukee & St. Paul will build at West Milwaukee 200 hopper bottom gondola cars of special design.

The Merchants' & Planters' Oil Co., of Houston, Tex., is considering an order of 25 tank cars. Possibly the cars may be rented.

The Great Northern, we understand, will not build at its own shops the 100 cars of 100,000 lbs. capacity on which it recently got prices of materials.

The Duluth & Iron Range is considering ordering more steel cars; probably about 50 will be bought and the order given to the Pressed Steel Car Co., increasing its present order to 400.

The Chicago Great Western will probably ask prices before the end of February on 700 box, 200 vehicle and 100 stock cars. We also understand this company will order in the near future 10 or 12 chair cars and coaches.

The Pennsylvania is building 325 box cars at its Fort Wayne shops as reported several months ago. We are officially informed that no orders have been given since the one referred to above, notwithstanding published reports to the contrary.

The Seattle & International cars, referred to Jan. 19, will be built by the Northern Pacific. The order calls for 100 flat cars of 70,000 lbs. capacity, to measure 41 ft. long, 8 ft. 9 in. wide and 3 ft. 6 in. high, and to have American steel bolsters, Westinghouse brakes, Tower couplers, M. C. B. journal boxes and journal box lds, American Steel Foundry trucks and Griffin wheels.

The Hocking Valley order for 1,000 coal cars with the American Car & Foundry Co., referred to last week, calls for July delivery. The cars will be of 80,000 lbs. capacity, measure 36 ft. long and 9 ft. 8½ in. wide over end sills and 3 ft. 7 in. high and have Simplex bolsters, Monarch brake beams, New York air brakes, Buckeye couplers, American dust guards and French springs.

#### BRIDGE BUILDING.

AMITE, LA.—The time for receiving bids for a combination bridge over the Tangipahoe River has been postponed from Feb. 24 until after the March meeting of the County Commissioners. Edward Gookin, Hammond, La., may be addressed.

AKRON, IA.—A bridge is proposed by Plymouth County across the Sioux River at this place.

ALLEGHENY, PA.—The Lindmore Bridge Co. will shortly apply for a charter to build a bridge across Butcher's Run from Dunlap St., Allegheny, to a point in Reserve Township, which will probably cost \$100,000. F. J. Torrance and A. C. Latimer are interested.

The great trestle work of the Ohio Connecting RR. in Lower Allegheny will be replaced by a more substantial structure this year.

BALTIMORE, MD.—The stockholders of the Baltimore & Lehigh RR. will hold a meeting on Feb. 13 to consider a proposition to rebuild this road and replace some of the wooden bridges with steel structures.

The Mayor is considering the practicability of connecting York Road with Druid Hill Park by opening Twenty-ninth St. and building a suspension bridge across the ravine at Jones' Falls to the Lake Drive. The bridge will be at least 700 ft. long.

The Baltimore & Ohio will rebuild several bridges on the main line.

BOSTON, MASS.—A bill has been introduced in the Massachusetts Senate for the city of Boston to rebuild the Broadway bridge across Fort Point Channel. The New England RR. will pay part of the cost, the total of which is not to exceed \$300,000.

BRIGHTON, N. Y.—A bill is before the Legislature for a steel hoist bridge over the Erie Canal at the village of Brighton, Monroe County, the expense to be borne by the State.

CHARLOTTETOWN, P. E. I.—It is stated that bids are asked until Feb. 14 by the Department of Public Works for a steel bridge to cross South River at Murray Harbor, South. Richard Smith, Secretary, Provincial Public Works Department. (Nov. 17, 1899, p. 797.)

CHICAGO, ILL.—In order to get the required flow of water through the Drainage Canal, it is probable that some, if not all, of the center pier bridges will have to be replaced by bascule bridges. At the meeting of the City Council, Jan. 29, Mayor Harrison suggested that the Trustees of the Chicago Sanitary District should be asked to take up the question of removing the bridges at the expense of the Sanitary District. The indications now are that the Sanitary District will agree to replace the bridges at Harrison, Twenty-second, Eighteenth, State and Washington streets with bascule bridges, and that the Washington St. bridge will be the first one replaced. It will be removed by the city and the new bridge built by the Sanitary District. Conferences were held last week and are again being held this week, and it seems probable that the problem of new bridges will soon be solved and that two of the new bridges will be built this year. Even if the money were available, it is doubtful if material could be obtained in less than a year for all of the bridges in question.

CLEVELAND, O.—The City Council has under consideration a bill providing for issuing bonds for not over \$2,000,000 to abolish the grade crossings in this city.

CONNELLSVILLE, PA.—The Commissioners of Fayette County want bids for a suspension bridge over the Youghiogheny River between Conneltsville and New Haven.

DETROIT, MICH.—Bills are before Congress for new bridges at Twelfth St. and at Fort Wayne.

DULUTH, MINN.—The matter of a viaduct on Garfield Ave. is again under consideration.

EAST LONGMEADOW, MASS.—This town has petitioned for a bridge over the tracks of the New England RR. at Robeson crossing. W. H. Hall, Chairman of the Board of Selectmen.

ELGIN, ILL.—New plans and specifications are being made for the two iron bridges for which bids received in December were rejected. The new structures are to cost \$50,000. A. G. Ritter of Chicago, Ill., is engineer in charge. Wm. F. Sylla, City Clerk. (Dec. 8, 1899, p. 850.)

ELIZABETHTON, TENN.—The Virginia & Southwestern RR. is asking bids for four iron bridges in Carter County, Tenn.

EMPORIUM, PA.—An iron bridge is proposed over the Portage Creek by Cameron County Commissioners. A. F. Vogt, Commissioner.

GEORGETOWN, D. C.—Reports state that the wooden trestles on the Great Falls Electric Road are to be replaced by iron spans.

GETTYSBURG, PA.—Viewers have reported in favor of a bridge over Kauffman's Run, Hamilton Township.

Viewers have been appointed to consider a site for a bridge over Two Taverns Run.

GLENWOOD, PA.—It is stated that the Baltimore & Ohio will rebuild part of the bridge which spans the Monongahela River above Glenwood. (See also Baltimore.)

GRAND RAPIDS, MICH.—The Grand Rapids Bridge Co., has filed articles of association with the County Clerk. It is to have a capital of \$50,000, and proposes to repair and build bridges. M. J. Reiseiger and J. M. Vanderberg are interested.

GUELPH, ONT.—Wellington County Council has decided to replace Gibson's bridge, on the town line between Peel and Arthur, with a steel structure.

A new bridge will also be built by the county on the boundary line between Minto and Normandy.

HARRISBURG, PA.—A county bridge is petitioned for over Paxton's Creek at Wolfe's Mills.

HAWKESBURY, CAPE BRETON.—The Canso & Louisburg, a new railroad for Cape Breton Island, will need either a bridge or tunnel across the Straits of Canso. The charter gives the company right to build either.

JOLIET, ILL.—A bridge is under consideration over the Illinois & Michigan Canal at Jefferson St.

KING WILLIAM, VA.—The bridge proposed by King William County over Pamunkey River will be near New Castle ferry, between King William and Hanover counties. (Jan. 26, p. 61.)

LEWISTON, IND.—Nez Perces and Latah counties will immediately advertise for bids for building bridges owned jointly by the two counties to replace those destroyed by a recent flood.

LISTOWELL, ONT.—The County Council, at their last meeting, considered a proposition for a bridge on the town line between Elma and Mornington.

LOCK HAVEN, PA.—Nothing will be done with the proposed 120-ft. steel bridge to be built over Beech Creek, between the two counties, until the viewers' report is presented to the Grand Jury of both Clinton and Center counties, in May.

LOCKPORT, N. Y.—The sum of \$8,000, in addition to the \$16,000 already appropriated for rebuilding the bridge over the Erie Canal at Chapel St., has been appropriated by the State.

MANCHESTER, N. H.—The city officers, with the Assistant Chief Engineer of the Boston & Maine, have been considering the matter of a bridge 60 ft. wide, with 8-ft. sidewalks, to replace the Elm St. bridge.

MUSCATINE, IA.—Bids are wanted soon for the 400-ft. steel bridge needed on the Muscatine, Tipton & Northern. T. B. Dower, Chief Engineer.

NATCHITOCHES, LA.—The U. S. Senate has passed a bill granting the Natchitoches & Red River Valley Railroad the right to build a bridge across the Red River in Louisiana.

NEW BRUNSWICK, N. J.—The Pennsylvania RR. has presented a petition to the City Council stating that the company desires to elevate its tracks through New Brunswick, and has appropriated \$500,000 for that purpose.

NEW CASTLE, PA.—An overhead bridge is proposed over the W. N. Y. & P., and P. & W. tracks on Moravia St.

NEW YORK, N. Y.—The Secretary of War has approved the plans of the East River bridge which will cost about \$15,333,000.

Mr. Sewell of New Jersey has introduced a bill in the United States Senate extending to Jan. 1, 1912, the time for building the proposed bridge across the Hudson River between New York City and Jersey City.

NORFOLK, VA.—A bridge will probably be built over the Elizabeth River from Norfolk, Va., to Berkeley. The syndicate in which R. Lancaster Williams of Richmond is interested owns franchises for electric railroads in both places, and it is said the bridge will be built to connect both roads.

NORTH TONAWANDA, N. Y.—A bill is before the Legislature appropriating \$14,000 for a steel canal bridge in North Niagara St.

OGONTZ, PA.—An iron and concrete bridge is contemplated by the borough authorities at a cost of about \$15,000. Plans have been made and bids are wanted. (Jan. 12, p. 27.)

OMAHA, NEB.—The citizens of the western portion of Douglas County want the county commissioners to build a wagon bridge across the Platte River at a point somewhere on the western border of the county.

PATERSON, N. J.—The proposition to bridge the Passaic River from the Little Falls Road to the West Side Park is said to be taking definite shape. A bridge at this point will probably be 253 ft. long. Address the County Board of Freeholders.

PAULDING, O.—Paulding County has a bill before the Legislature to authorize that county to issue \$35,000 of bridge bonds.

PITTSBURGH, PA.—Plans are now with E. M. Bigelow, Director of Public Works, for the elimination of the grade crossing of the Consolidated Traction Co. and the Pittsburgh Junction RR. on Liberty Ave. and Thirty-third St.

It is stated that a bridge will be built at Second Ave., over the tracks of the Panhandle by the Second Ave. Traction Co.

The bridge contemplated by the Pennsylvania Co. for the Fort Wayne across the Allegheny River in connection with the union station improvements will cost about \$1,000,000. The Pennsylvania Co. will also build some new bridges on the Western Division of the Fort Wayne, on the Indianapolis and Indianapolis & Vincennes divisions of the Panhandle, and one or two on the Louisville Division. About 20 old bridges will be replaced with new steel bridges.

A bridge is proposed as an extension of Wilmet St., spanning Panther Hollow to Schenley Park. The work will cost about \$150,000.

PORTSMOUTH, VA.—The bill to incorporate the Portsmouth & Pinner's Point Bridge Co. was passed by the Virginia Senate last week.

PROVIDENCE, R. I.—The city of Providence has decided to abolish the grade crossing of the N. Y., N. H. & H. at Acorn St.

In connection with the elimination of the above named crossing, a bridge is proposed from Tefft and Dean Sts. to Harris Ave.

RANKIN, PA.—The Pittsburgh & Lake Erie RR. has completed plans for rebuilding the iron bridge over the Monongahela River between Rankin and Homestead. It will probably cost \$50,000.

ROCHESTER, N. Y.—A bill has been introduced in the Senate for the proposed bridge over the Erie Canal at Plymouth Ave.

ROCKFORD, ILL.—Plans and estimates will be made by D. W. Mead for two spans for the North Town bridge, according to report. Edward Main, City Engineer.

SAGINAW, MICH.—Bids will be wanted by the Board of Public Works for a 485 ft. steel bridge to be built over the Saginaw River as soon as the War Department has approved the plans. It will cost \$200,000. H. E. Terry, City Engineer.

SPRINGFIELD, MASS.—A bill has been introduced in the Massachusetts House to permit the Commissioners of Hampden County to build the proposed bridge over the Connecticut River, which has been under consideration for some time and already mentioned in this column, between Springfield and the town of West Springfield. The roadway for this bridge must not be less than 57 ft. wide. The easterly approach will pass under the tracks of the N. Y., N. H. & H. RR. The entire cost is not to exceed \$400,000, and the County Commissioners are authorized to issue bonds for that amount. Three commissioners are to be appointed to select the site.

SPRINGFIELD, O.—Reports state that a bridge is proposed over the Mad River at a place called Owl Town.

SYRACUSE, N. Y.—A bill is before the Legislature appropriating \$11,500, half the cost of the renewal and replacing of the hoist bridge over the Erie Canal on Catharine and Almond Sts. The city will bear the remaining cost.

THREE RIVERS, MICH.—A steel bridge is proposed over the St. Joseph River.

WELLSVILLE, O.—Bids are asked until Feb. 14 for a steel bridge 310 ft. long across Little Yellow Creek. C. Bowman, Chairman of the Board of Commissioners of Columbiana County, Lisbon, O.

YARMOUTH, N. S.—The Nova Scotia Development Co. will build steel bridges over the Barrington and Clyde rivers on the line of the Halifax & Yarmouth Ry. Plans are at the engineer's office, this place.

YORKVILLE, S. C.—The bridge to be built across the Catawaba River by York County will be an iron structure about 500 ft. long. It will be built near Fort Mill. We are told that the county does not expect to advertise for bids. T. G. Culp, Supervisor. (Jan. 19, p. 46.)

#### Other Structures.

BIRMINGHAM, ALA.—The Republic Iron & Steel Co. is securing material for a 700-ton blast furnace at Birmingham. The company recently bought 20,000 acres of iron ore lands in Alabama.

CHICAGO, ILL.—When an ordinance for the elevation of the down-town tracks of the Chicago, Rock Island & Pacific and Lake Shore & Michigan Southern, which is now under consideration, is passed, a new station will be a necessary part of the improvement. Preliminary sketches have been made by Shepley, Rutan & Coolidge, of Chicago, and the plans contemplate a 10-story modern building to cost about \$1,500,000. The trains will enter on a level with the Union Elevated Loop. These plans have not yet been considered and approved by the Directors of the two roads. (Dec. 8, 1899, p. 851.)

DENVER, COL.—The Colorado & Southern has prepared plans for its new shops which are to be built at Denver. The estimated cost of the entire improvement is placed at \$500,000. They will be located on the Platte River near Seventh St. The machine shop will be 125 x 370 ft. The C. & S. now occupies the Union Pacific shops at Fortieth St. The Pullman Company will occupy the Union Pacific shops after the C. & S. evacuates.

FOND DU LAC, WIS.—The Milwaukee Bridge & Iron Works, J. G. Wagner & Co., proprietors, Milwaukee, Wis., have the contract for building the shops for the Wisconsin Central Ry. at Fond du Lac. There will be three buildings to be completed before July 1, 1900. (Nov. 17, 1899, p. 798.)

HARRISBURG, PA.—The Harrisburg Pipe & Pipe Bending Co. is about to issue \$100,000 of improvement bonds to cover the cost of building and equipping its new pipe mill. When in operation it will employ about 200 more men.

MINNEAPOLIS, MINN.—The "Soo" Line has plans prepared for a new station at Minneapolis to cost \$20,000. The building will have a frontage on Canal St. of 210 ft., and on Magazine St. of 43 ft.



**PHILADELPHIA, PA.**—Roydhouse, Arey & Co., contractors for the new buildings for the Baldwin Locomotive Works, were granted a building permit Jan. 30. The alterations and additions to the machine shop of the Baldwin works on the West side of Broad St., south from Hamilton St., to Pennsylvania Ave., will cost \$125,000. The building is at present three stories high, having a frontage along Broad St. of 207 ft., and extending back 66 ft. It is the intention to remove the third story and build four additional stories, making the building six stories high. It will be of iron columns and girders.

The Belmont Iron Works, Twenty-second and Washington Sts., Philadelphia, will build an extension to their works.

**PETOSKEY, MICH.**—The Grand Rapids & Indiana Ry. is having plans made for a new station at this place.

**WILKESBARRE, PA.**—Mayor Nichols has vetoed the ordinance granting the right to the Delaware & Hudson Co. to build a 2½ story extension to its freight house in this city.

## MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page vii.)

### National Electric Light Association.

The thirty-third annual meeting of this Association will be held in Chicago, May 22-24 next. S. T. Carnes, of Memphis, Tenn., is President of the Association, and George F. Porter, 136 Liberty St., New York, is Secretary.

### Western Railway Club.

At the next meeting of the Western Railway Club, to be held February 20 at the Auditorium Hotel, Chicago, Mr. C. H. Quereau, Assistant Superintendent of Machinery, of the Denver & Rio Grande, will present a paper on "Tonnage Rating."

### American Society of Civil Engineers.

A regular business meeting was held on Wednesday, February 7, at 8.30 p. m. A paper by William B. Landreth, M. Am. Soc. C. E., entitled "The Improvement of a Portion of the Jordan Level of the Erie Canal," was presented for discussion. This paper was printed in the Proceedings for December, 1899.

### Western Society of Engineers.

At a meeting of the Western Society of Engineers, Wednesday evening, February 7, in the Monadnock Block, Chicago, Mr. J. H. Lary, Division Engineer of the Iowa, Minnesota & Northwestern, presented a paper on "Railroad Preliminary Survey by Stadla." Papers read at previous meetings, "Discharge Measurements of Niagara River at Buffalo" and "Electrical Underground Construction," were discussed.

### The New York Railroad Club.

We have already announced that the next regular meeting of the New York Railroad Club will be held at the rooms of the Metropolitan Street Railway Association, Fifth street and Seventh avenue, at the usual hour. This is to be an electrical evening. Prof. Durand, of the International Correspondence School, of Scranton, will open the discussion and he will be followed by Mr. Potter, of the General Electric Co., Mr. Pearson, Mr. Starrett and Mr. Reed, of the engineering staff of the Metropolitan. No doubt the evening will be one of especial interest.

### St. Louis Railway Club.

The next meeting of the St. Louis Railway Club will be held in the parlors of the Southern Hotel, Friday of this week, at 3 p. m. "Pneumatic Tools" is the title of a paper which will be read by Mr. Edw. C. Schmidt, Instructor Railway Engineering, University of Illinois. Over fifty stereopticon views will be used to illustrate this paper.

A paper on "Transportation Department of Railroads" has been prepared by Mr. Russell Harding, Vice-President and General Manager St. L. S. W. Ry.

### Maintenance of Way Association.

The first annual meeting of the American Railway Engineering and Maintenance of Way Association will be held in Chicago, March 14th and 15th, 1900. Headquarters will be at the Victoria Hotel. The business will be the election of officers, the address of the President, and the consideration of the preliminary reports of the Chairmen of the fifteen Standing Committees. It is expected that the Chairmen of these committees will present short papers outlining the scope and future program of the committee work. These papers will be generally discussed by the members. The association has a charter membership of 235 members, representing 140,000 miles of railroad in the United States, Canada and Mexico, and embraces 104 different railroad corporations. Railroad officials connected with or interested in maintenance of way matters are invited to be present at the meeting, whether they are members of the Association or not. Persons desiring to join the Association can address either the President or Secretary, viz., John F. Wallace, Asst. Second Vice-President, Illinois Central RR., Chicago, President; L. C. Fritch, Supt., B. & O. S. W. RR., Washington, Ind., Secretary.

### International Association for Testing Materials.

The stated quarterly meetings of the Executive Committee of the American Section was held January 6 at the house of the American Society of Mechanical Engineers, New York. The meeting was called to order at 2 p. m. Present: Messrs. Merriman, Howe, Kreuzpointner and Henning. The Treasurer presented the following statement of his account with the Publication and Research Fund.

Receipts from Contributions.	
Robert A. Carter.....	\$100.00
Logan Iron and Steel Company.....	20.00
Carbon Steel Company.....	50.00
Standard Steel Company.....	25.00
James M. Porter.....	100.00
Wayne Iron and Steel Company.....	50.00
Central Iron and Steel Company.....	50.00
Robert W. Lesley.....	20.00
Bethlehem Steel Company.....	100.00
Altoona Iron Company.....	100.00
Milton Iron Company.....	10.00
Shoenberger Steel Company.....	30.00
	<hr/> \$655.00
Expenditures .....	89.65
Balance on hand, Jan. 1, 1900.....	\$565.35

A request was received from Committee No. 1 to add to its membership the American Steel and Wire Company, the National Tube Company, the Shelby Tube Company, the Standard Steel Company, and John A. Roebling Sons Company, or a representative from each. The request was granted, it being understood that these parties are to become members of the Association, if not so already. It was further resolved, as it is the policy of the Association that its Technical Committees should be nearly equally divided between producers and consumers, that Committee No. 1 be requested to name five engineers not directly associated with manufacturing, to balance the five firms above mentioned.

It was voted that the Third Annual Meeting of the American Section be held in September or October, and that the fixing of the exact date be deferred until the stated meeting of the Executive Committee on April 7, 1900.

### Illinois Society of Engineers and Surveyors.

The fifteenth annual meeting of this Society was held at Moline, Ill., Jan. 24-26, with a good attendance of members from different parts of the State. The address of welcome was made by P. H. Wessel, Mayor of Moline, and responded to by Almon D. Thompson, President of the Society. The first business was the report of the Executive Board and the report of the Executive Secretary and Treasurer, Jacob A. Harman, of Peoria. The programme of the meeting also included the following:

Report of Committee on Sanitary Legislation; D. W. Mead, Chairman.

Paper: "A State Municipal Work Commission," by C. C. Brown.

Discussion: "Roads, Bridges, Drainage; Proposed Legislation for Roads, Sewers and House Drainage."

Report of Committee on Drainage; J. L. Clark, Chairman.

Discussion: "In Pumping Plants for Drainage Districts, What Capacity Should Be Provided per Acre?"

Report of Committee on Public Highways; W. H. Rosecrans, Chairman.

Report of Committee on Land and City Surveying; H. C. Paddock, Chairman.

Paper: "Land Marks," by J. Foster Schmeltzer.

Paper: "An Examination of Recent Supreme Court Decisions of Interest to Surveyors and Civil Engineers," by W. C. Holbrook.

Discussion: "Iron and Stone Monuments Should Be Set by Authority at the Centers and Corners of Sections in Every County."

Paper: "Garbage Collection," by Col. Edward Kittelsen.

Discussion: "Form of Cross Sections and Width of Roadway for Public Highways."

Report of Committee on Paving Brick Specifications and Tests; A. N. Talbot, Chairman.

Report of Committee on Water Works: 1. Notes on Construction. 2. Cost of Pumping. 3. Form of Water Works Report; C. C. Brown, Chairman.

Discussion: "Paving."

Paper: "Construction of Kewanee Sewerage System, Cost, Etc.," by J. C. Quade.

Report of Committee on Sewers; J. W. Alvord, Chairman.

Discussion: "Proper Maintenance of Sewer Systems."

Discussion: "Determination of Amount of Subsoil Water Finding Its Way into Newly Constructed Sewers and Its Consideration as a Factor in Computing Sizes."

Discussion: "In the Offices of City, Village and County Engineers, What Is the Best Method of Indexing Maps and Drawings?"

Report of Committee on Railroads; E. E. R. Tratman, Chairman.

Paper: "Improvement Work on the Chicago, Burlington & Quincy RR.," by E. P. Chapin.

Paper: "Improvement Work on the Illinois Central RR. in 1899," by W. E. Angler.

Paper: "Education in Railway Engineering at the University of Illinois," by Edward C. Schmidt.

Paper: "Construction of the St. Louis, Peoria & Northern Railway," by F. G. Jonah.

Discussion: "Cross Section Surveys for Railway Construction, Best Method in."

Paper: "Economic Railways in County Districts," by E. E. R. Tratman.

Paper: "Railroad Construction," by C. B. McClure.

Report of Committee on Exhibit of Drawings; J. G. Melluish, Chairman.

Paper: "Some Uses of the Steam Indicator," by E. E. Johnson.

Paper: "Some Notes on Electric Light and Power Distribution," by D. W. Mead.

Discussion: "Concrete vs. Stone Masonry for Bridge Piers and Abutments."

Paper: "Municipal Ownership of Combined Electric Light and Water Works Plants," by Louis E. Fischer.

Report of Committee on the Press, J. A. Harman, Chairman.

Installation of new officers.

During the meeting visits of inspection were made to the Wing Dam and water power development; and to the U. S. Arsenal and Government Works at Davenport and Rock Island.

## PERSONAL.

(For other personal mention see Elections and Appointments.)

—C. O. Troilus, who from 1862 to 1887 was General Manager of the Swedish State Railroads, and was looked up to and beloved by all railroad men in Sweden and many elsewhere, died recently, aged 86 years.

—Mr. W. H. Hudson, Master Mechanic on the Southern Railway, at the Spencer shops, at Spencer, N. C., has resigned. He has no definite plans ahead other than to rest and attend to private business for a time. Doubtless he will soon be available in case he is wanted for similar work.

—Louis de Perl, Manager of International Traffic of the Russian Railroads, last December received many testimonials from his official superiors and the Russian and German railroads with which he has chiefly to deal, on the completion of the twenty-fifth year of his service in his present position.

—Mr. J. H. Thompson, Assistant Division Superintendent of the Southern Pacific at Oakland Pier, Cal., died Jan. 29. He was born in Massachusetts forty-

nine years ago, and began his railroad career as a brakeman on the Cheshire Road (Fitchburg). In 1890 he was appointed to the position he held at the time of his death.

—Mr. Percival C. Sneed died at his home in Newark, O., Jan. 31. He was 37 years old and was a native of Georgia. When quite young he entered the service of the Baltimore & Ohio, and in 1891 was appointed Superintendent of the Chicago Division, which position he held until 1899, when ill health compelled him to resign.

—Capt. J. W. Gillman, Superintendent of the Goodrich Transportation Co., of Chicago, died suddenly of apoplexy about 10 p. m. Jan. 31 on a Chicago & Northwestern train near Manitowoc, Wis. Capt. Gillman was about 65 years old and had been in the service of the Goodrich Company for 30 years. for the last ten years as Superintendent.

—Mr. Benjamin Thompson has resigned the position of Resident Engineer on the Southern Railway at Greensboro, N. C., to take effect Feb. 1. We do not learn that his successor has been appointed, although Mr. R. E. Harwood, Assistant Engineer, takes charge of the office. Mr. Thompson resigns because he feels the need of a rest, his health being considerably impaired. He will be for the present at Highland Park, Hamilton County, Tenn.

—On Saturday evening, Feb. 3, a dinner was given to Mr. J. F. Wallace, the new President of the American Society of Civil Engineers, at the Technical Club, Chicago, by some of the members of the society who live in that city. Capt. R. W. Hunt presided, and the others present were: Messrs. O. Chanute, Onward Bates, A. V. Powell, Charles L. Strobel, Isham Randolph, C. F. Quincy, H. E. Horton, Ralph Modjeski, E. C. Shankland and C. E. Billin.

—Mr. John H. Harris, Superintendent of the Choctaw, Oklahoma & Gulf, has been appointed General Superintendent of the same road from Feb. 1. Mr. Harris was born in Albany, N. Y., June 24, 1859, and began railroad work when 12 years old as a clerk in the offices of the Philadelphia & Reading. From that time he has been constantly in railroad service on different roads and in October, 1898, was appointed Superintendent of the Choctaw, Oklahoma & Gulf. Since that time the road has been extended in both directions until it is now 565 miles long. The general offices of the road are at Little Rock, Ark.

—Alfred Brandt, one of the most eminent of tunnel engineers, in charge of the work at the north end of the Simplon Tunnel, died of heart disease recently at Brieg. A native of Hamburg, he received his engineering education at Zurich. He served under Hellweg during the construction of the Gotthard Tunnel, where he invented drills which were afterward much used in tunnel work. In his last work he received great credit for his methods of securing ventilation and cooling the air, and for new methods of exploding rock by fluid oxygen and compressed water, which do not render the air noxious.

—Mr. James Charlton, who recently retired from the position of General Passenger & Ticket Agent of the Chicago & Alton after more than 28 years of service, was presented with a loving cup on Jan. 30 by the members of the Western Passenger Association at a luncheon given to Mr. Charlton at the Great Northern Hotel, Chicago, and attended by over 30 members of the Association. Mr. P. S. Eustis, of the Chicago, Burlington & Quincy, made the presentation speech, to which Mr. Charlton responded, after which short addresses were made by others present, expressing appreciation of Mr. Charlton as a man and as a business associate.

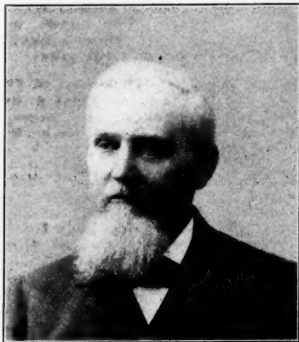
—Mr. F. J. Hawn, who has recently been made Division Superintendent of the Great Northern at Breckenridge, Minn., was born June 15, 1863. He entered railroad service with the Wisconsin Central in March, 1877, as call boy, and continued with that company until Sept. 1, 1898, serving as operator, station agent, shipping clerk and storekeeper until 1882; as Train Dispatcher and Chief Dispatcher until 1887; as brakeman and conductor until 1891; as chief clerk to the Division General Superintendent the same year, and then as Superintendent of Transportation to 1894, and Trainmaster to 1898. He became Assistant Division Superintendent of the Great Northern in September, 1898, serving successively on the Cascade, Montana and Breckenridge divisions until his present promotion.

—Dr. Numa Droz, Manager since its opening in 1893 of the International Freight Bureau in Berne, Switzerland, under whose regulations nearly all the freight exchanges over railroads of ten or more countries on the Continent of Europe are made, died suddenly Dec. 15 last. Droz was an extraordinary man. At the age of 18 he was already a leading personage in his canton, was a cabinet officer in the Ministry of the Confederacy at 31, and before he was 37 became President of the Confederacy, a position which he held also six years later, while he resigned from the cabinet to accept the place which he held at the time of his death, in which he rendered most efficient service. The regulations of the International Bureau now are in force on some 115,000 miles of railroad, including France on the west and Russia on the east.

—Mr. Edmond D. Bronner, Assistant Superintendent of Motive Power of the Michigan Central, has been appointed Superintendent of Motive Power, succeeding Mr. Robert Miller, retired. Mr. Bronner is prominent in that class of younger men now fast coming to the front. Since 1889 he has been an active member of the Master Car Builders' Association, and during that time he has served on a number of important committees and has held office as Vice-President and as a member of the Executive Committee. It will be remembered that out of deference to a tradition he refused to accept a nomination as President at the last Saratoga Convention, because his jurisdiction was not solely over the car department. Since 1898 he has been a member of the Master Mechanics' Association. Mr. Bronner was born Feb. 19, 1859, at Buffalo, and was educated at the United States Naval Academy, entering the car department of the Canada Southern in 1880 as draftsman. From February, 1883, to April 12, 1886, he was a draftsman in the Detroit Car Shops of the Michigan Central; April 12, 1886, to Feb. 1, 1890, General Foreman of the same shops, then being appointed Master Car Builder, and a few years later Assistant Superintendent of Motive Power.



—Mr. Robert Miller, who has been for three years Superintendent of Motive Power and Equipment of the Michigan Central Railroad, was dismissed without notice Jan. 24, to take effect Feb. 1, and is succeeded by Mr. E. D. Bronner, who has been Assistant Superintendent of Motive Power and Equipment. Mr. Miller was born in 1839 near Ithaca, N. Y., and began railroad work in 1858. He served in the car shops of the Chicago, Burlington & Quincy until the civil war broke out, when he enlisted under the first call for 75,000 men and served three months. In 1862 he re-enlisted, served through the war and was mustered out in 1865. He got a commission and is now a Companion of the Loyal Legion. Within a month after being mustered out he returned to the Chicago, Burlington & Quincy as foreman of a shop.



Eventually he became foreman of the car shops of the C. B. & Q. at Aurora. In 1876 he became Master Car Builder of the Michigan Central (with charge also of buildings and water-works) and in 1884 Assistant General Superintendent of the road. In 1890 he was made General Superintendent, which position he held until 1896, when he was made Superintendent of Motive Power and Equipment. Mr. Miller is a man of much physical and mental vigor, industrious and upright, and has long had the respect of a great number of railroad men, and it is commonly said that the condition of motive power, cars, shops and other property under his charge has always been kept up to a high standard. He has done much useful committee work in the Master Car Builders' Association and in discussions the weight of his opinion has always been effective. It is unfortunate for a railroad company to lose the service of such a man, however good may be the man who succeeds him, and obviously if Mr. Miller wishes to re-enter railroad service there are places for him.

—We gave last week a short sketch of the railroad life of Mr. George W. Stevens, who has just been elected President of the Chesapeake & Ohio Railroad, and now we are able to publish a portrait of him. It is hardly necessary to add anything to what we said last week, although we find an interesting statement in one of the Richmond newspapers as to the feeling toward Mr. Stevens which prevails among the employees of the road. A member of the General Committee of the Order of Railroad Conductors is quoted as saying "the employees of the Chesapeake & Ohio know that if the selection of the President was left with us Mr. George W. Stevens would be the man. Every man in the employ of the company feels that he has a friend in the General Manager, and when we cannot agree among ourselves we unload our troubles on Mr. Stevens with the consciousness that justice will be meted out." Mr. Stevens has always shown a great interest in the affairs of his employees and sympathy with them, and has been active and interested in the establishment of the club rooms for the men in co-operation with the Railroad Young Men's Christian Association. The first of these was established at Covington, Ky., and



has there been in operation for nine years. Another one was soon established at Hinton, W. Va., where a building was put up by the joint contributions of the railroad company and the men. Other rooms have been established at Gladstone, Va., at Handley, W. Va., at Clifton Forge, Va., at Russell, Ky., at Ashland and at Lexington. At the more important points there are libraries and in general these buildings are equipped with reading rooms, baths, bedrooms and restaurants. The daily attendance for 1899 at all of the eight rooms aggregated 888, and 92 beds were used per day. The meals and lunches served per day amounted to 135.

#### ELECTIONS AND APPOINTMENTS.

**Algoma Central.**—The statement made by a contemporary that W. B. Rosevear had been appointed General Manager of this company is incorrect. Mr. Rosevear was appointed Assistant to President F. H. Clergue.

**Arkansas Southern.**—The general offices of this company have been removed from Junction City, Ark., to Ruston, La.

**Atchison, Topeka & Santa Fe.**—H. W. Sharp has been appointed Superintendent of Terminals at Kansas City, also Freight Agent at Kansas City and Argentine stations, to succeed J. W. Starr, resigned, effective Feb. 1.

**Baltimore & Ohio.**—S. M. Prevost (Third Vice-President of the Pennsylvania) was, on Feb. 1, elected a Director of the B. & O. James Bartol has been appointed Assistant to General Auditor G. W. Booth. J. Billingham, Master Mechanic at Glenwood, Pa., has been transferred as Master Mechanic of the second, third, fourth and fifth divisions, with headquarters at Cumberland, Md., succeeding P. J. Harrigan and P. Hayden, transferred to other duties.

**Brainerd & Northern Minnesota.**—W. H. Gemmell, Assistant Secretary of the Northern Pacific has

succeeded O. O. Winter, resigned, as General Manager of the B. & N. M.

**Cairo, Memphis & Southern.**—H. R. Conklin has been elected Secretary, succeeding A. Schoepflin and C. F. Yegge, Treasurer, succeeding E. A. Leicht.

**Central Pennsylvania & Western.**—M. A. Berger has been appointed Superintendent, succeeding C. D. Berger, resigned.

**Central Vermont.**—Robert L. Burnap has been appointed Commercial Agent, succeeding F. S. Holbrook, resigned, headquarters at 88 Wall St., New York.

**Chesapeake & Ohio.**—We are informed that the offices of President and General Manager are to be combined and that there will be no General Manager appointed, for the present at least. Decatur Axtell was elected First Vice-President, succeeding G. T. Bliss, resigned.

**Chicago & Northwestern.**—Marvin Hughitt, Jr., has been appointed Freight Traffic Manager and is succeeded as General Freight Agent by E. D. Brigham, heretofore Assistant General Freight Agent at Chicago, Ill.

F. G. Benjamin has been appointed General Foreman at Boone, Ia., succeeding E. G. Taylor, W. G. Wallace succeeds Mr. Benjamin as General Foreman at Clinton, Ia.

**Chicago, Milwaukee & St. Paul.**—Changes have been made among the Division Superintendents as follows: C. A. Cosgrave succeeds W. J. Underwood as Assistant General Superintendent at Minneapolis, Minn. W. W. Collins succeeds Mr. Cosgrave at Mason City, Ia. J. F. Gibson succeeds Mr. Collins at Chicago, Ill. H. B. Earling succeeds Mr. Gibson at Marion, Ia. P. C. Eldredge succeeds Mr. Earling at Milwaukee, Wis., and G. H. Atkins, heretofore Trainmaster, succeeds Mr. Eldredge at Babcock, Wis.

**Cleveland, Cincinnati, Chicago & St. Louis.**—L. S. Rose, Acting Engineer Maintenance of Way at Springfield, O., has been transferred as Engineer Maintenance of Way at Mt. Carmel, Ill., succeeding J. G. Shillinger. Mr. Shillinger supersedes Mr. Rose at Springfield, O., effective Feb. 1.

**Delaware, Lackawanna & Western.**—F. B. Smith has been appointed Superintendent of the Dining Car Department at Hoboken, N. J., effective Feb. 1.

**Detroit & River St. Clair.**—The officers of this company are: President, C. J. Reilly; Treasurer, C. M. Swift; General Manager, F. W. Brooks; Auditor, H. S. Swift, and Superintendent, I. R. Wadsworth.

**Erie & Wyoming Valley.**—J. M. Davis has been appointed Superintendent, with headquarters at Dunmore, Pa., effective Feb. 1.

**Fort Worth & Rio Grande.**—H. C. Wicker has been elected President, succeeding John Hornby, deceased.

**Holyoke & Westfield (N. Y., N. H. & H.).**—The officers of this company are: President, E. W. Chapin; Vice-President, C. B. Prescott; Treasurer, F. F. Partridge, succeeding E. L. Munn.

**Lake Shore & Michigan Southern.**—W. H. Lindley has been appointed Superintendent Dining Cars, to succeed M. T. Jones, resigned.

**Lake Terminal.**—A. C. Gary has been elected Treasurer, succeeding W. F. Saltmarsh.

**Mexican Central.**—Geo. F. Hawks, Division Superintendent at Cardenas, Mex., has tendered his resignation.

**Michigan Central.**—Edmond D. Bronner, heretofore Assistant Superintendent of Motive Power, succeeds Robt. Miller, retired as Superintendent Motive Power.

**Muscatine, North & South.**—Walter M. Gorham has been elected President, with headquarters at Philadelphia, Pa., and H. F. Balch, Vice-President, at Minneapolis, Minn.

**Muscatine, Tipton & Northern.**—The officers of this company, referred to in the Construction column, are: President, Milton Weston; Vice-President, E. L. Tobie; Secretary, O. H. Lloyd; Treasurer, L. M. Cole, all of Chicago; Chief Engineer, T. B. Downer, Muscatine, Ia.

**Newburgh, Dutchess & Connecticut.**—At a meeting of the stockholders, held Jan. 31, H. H. Reed was elected Treasurer, succeeding William A. Wells, resigned, effective March 1.

**New York Central & Hudson River.**—F. S. Holbrook has been appointed Assistant General Freight Agent of the West Shore, with headquarters at New York, to succeed H. S. Burgess.

**New York, New Haven & Hartford.**—A. R. Whaley has been appointed Superintendent of the Worcester Division, to succeed C. C. Burnett, deceased.

**Norfolk & Western.**—J. E. Battye has been appointed Division Master Mechanic of the Eastern General Division, succeeding R. P. C. Sanderson, resigned. The following have been appointed General Foremen: H. F. Greenwood, of the Locomotive Department at Roanoke shop, succeeding Mr. Battye, transferred; H. F. Staley, at Kenova, succeeding F. P. Hickey, resigned; L. D. Gillett, at West Roanoke, succeeding S. K. Dickerson, resigned, effective Feb. 1.

**Northern Pacific.**—P. W. Corbett has been elected Assistant Secretary, succeeding W. H. Gemmell.

**Pennsylvania.**—C. H. Potts, Master Mechanic at Erie, Pa., has been appointed Master Mechanic at Sunbury, Pa., to succeed R. K. Reading. J. S. Mengel succeeds Mr. Potts at Erie, Pa.

**Philadelphia & Reading.**—The lines of railway lately operated by the Wilmington & Northern, together with the Schuylkill & Lehigh and the Reading & Columbia, will be designated as the Wilmington & Columbia Division. A. G. McCausland has been appointed Superintendent of the W. & C. Division. The East Pennsylvania, Catasqua & Fogelsville, Allentown, the Lebanon Valley Branch, Middletown & Hummelstown, and Philadelphia, Harrisburg & Pittsburgh will be designated as the Lebanon Division, with A. M. Wilson as Superintendent. The Superintendents' headquarters for the above Divisions will be at Reading, Pa., and the

position of Superintendent of the Reading and Columbia Division is abolished, effective Feb. 1.

**Plant System.**—H. A. Ford has resigned as Trainmaster of the Kansas City, Memphis & Birmingham to accept the position of Superintendent at Gainesville, Fla., of the P. S., succeeding W. B. Denham, recently appointed General Superintendent.

**Quincy, Carrollton & St. Louis.**—H. S. Rearden has been appointed General Manager.

**St. Louis, Kansas City & Colorado.**—L. M. Fouts, President and General Manager of the Weatherford, Mineral Wells & Northwestern, has been appointed General Manager of the St. L., K. C. & C., with headquarters at St. Louis, Mo.

**Southern.**—Benjamin Thompson, Resident Engineer at Greensboro, N. C., has resigned, effective Feb. 1. W. H. Hudson, Master Mechanic at Spencer, N. C., has resigned.

**Southern Pacific.**—E. A. Gilbert, heretofore Master Car Repairer at Oakland, Cal., on the Pacific System, has been appointed Assistant Master Car Builder on the same system, with headquarters at Sacramento, Cal.

H. Englebright succeeds Mr. Gilbert as Master Car Builder at Oakland, Cal.

#### RAILROAD CONSTRUCTION. New Incorporations, Surveys, Etc.

**ALBANY & HUDSON.**—This company, formerly the Kinderhook & Hudson, expects to have the entire line changed to electric power by May 30. The road is to be extended north from Niverville to Albany.

**ALBERTA RAILWAY & COAL.**—Application is being made to the Dominion Parliament for an extension of time for the branch from a point near Lethbridge, B. C., to a point in range 30, fourth meridian, N. W. T., with branches 15 miles long.

**ATCHISON, TOPEKA & SANTA FE.**—Surveys are reported in progress for reducing grades on either side of the city of Springer, N. M.

**BALTIMORE & LEHIGH.**—The directors have adopted a resolution recommending to the stockholders the broad gaging of the entire line. A meeting of the stockholders is to be held Feb. 3. The road runs from Baltimore, Md., to Cardiff, 42.9 miles. It is proposed to relay it with 70-lb. rails. (Aug. 18, 1899, p. 688.)

**BALTIMORE & OHIO.**—Work is begun at Pittsburgh, Pa., to protect the tracks from the effects of floods along the Monongahela River.

An officer writes that nothing definite has been decided upon relative to the line connecting the Cleveland Terminal & Valley with the main line. (Dec. 29, 1899, p. 901.)

See also Railroad News column.

**BENWOOD & WHEELING.**—This company was incorporated in West Virginia Jan. 30, with a capital stock of \$1,000,000, to build a line from Benwood north to Wheeling, connecting the Baltimore & Ohio, the Pittsburgh, Cincinnati, Chicago & St. Louis and the Ohio River. Among the incorporators are Frank J. Hearne, Pittsburgh; J. N. Vance, J. D. Culbertson, L. E. Sands and N. B. Scott, Wheeling.

**BOSTON & MAINE.**—The directors of the Concord & Montreal have voted to issue \$400,000 bonds to pay for building the Manchester & Milford extension from Goffstown, N. H., southwest 18½ miles, via Bedford, Merrimack and Amherst. (Nov. 17, 1899, p. 800.)

**CAMBRIDGE SPRINGS NORTHERN.**—This company has been organized by residents of Cambridge Springs, Pa., to build a line from Cambridge to Waterford to connect with the proposed line of the Erie Eastern.

**CAPE FEAR & NORTHERN.**—Extensions are to be built soon, according to report, from Duketon, S. C., to the Cape Fear River at Cokesberry, 14 miles, and from Varina to Fuquay Springs.

**CHICAGO & NORTHWESTERN.**—An officer writes that the company has no intention at present of building a new line, as reported, between Sioux City, Ia., and Omaha, Neb. (Jan. 26, p. 63.)

**CHICAGO, ROCK ISLAND & PACIFIC.**—The company is putting in tracks to certain industries at East Moline, Ill., in connection with the Chicago, Milwaukee & St. Paul and the Chicago, Burlington & Quincy. (Official.)

Surveys are reported in progress from Garber, I. T., a new town on the line, to run east to South McAlester.

**DELAWARE, LACKAWANNA & WESTERN.**—An officer writes that the Edison Portland Cement Co. is building a new plant at Stewartville, N. J., and the railroad is putting in tracks for the same. (Feb. 2, p. 79.)

**DRY FORK.**—An officer writes that one or two preliminary lines have been run up Red Creek, but it is not yet determined whether, when the road is built, it will be operated as a common carrier or merely as a logging road. It will be only six to eight miles long and would not touch any existing town. (West Virginia Roads, Jan. 26, p. 64.)

**INDIANA, ILLINOIS & IOWA.**—An extension is to be made, according to report, from South Bend, Ind., east about 15 miles to Elkhart.

**IOWA ROADS.**—Fort Dodge capitalists are organizing to build a railroad from that city which is the junction point of the Chicago & Northwestern and the Iowa Central, to run southeast 37 or 39 miles, according to the route selected, via Stanhope on the Wall Lake Division of the Chicago & Northwestern, to Story City on the Iowa Central. Among those interested are: S. T. Meserve, an officer of the Marshalltown & Dakota; E. H. Rich, cashier of the First National Bank at Fort Dodge; A. R. Loomis and George Mason.

**JAMES RIVER.**—Senator Maynard has introduced a bill into the Virginia Senate to incorporate this company, with a capital stock of from \$10,000 to \$500,000, to build this line from Portsmouth northwest about 25 miles through the counties of Nor-



folk, Nasemond and Isle of Wight to Portsmouth, with branches not to exceed 20 miles. The road may be extended on to Richmond providing navigation is not interfered with in crossing rivers. Building is to be begun within two years from July, 1900. The incorporators are John L. Watson, A. J. Phillips, Charles C. Fink, D. W. Todd, J. W. Brown, W. P. Andrews, Gustavus Ober and T. J. Wood.

**LAWRENCEVILLE BRANCH.**—An extension is to be made, according to report, from Suwannee, Ga., north about 15 miles to Cumming. The citizens of Cumming will subscribe \$25,000.

**LOUISVILLE & NASHVILLE.**—The Alabama Construction Co. of Montgomery has taken the contract for the Alabama & Florida extension from Andalusia, Ala., southeast 45 miles to Geneva. Work is to be begun at once and the contract completed by Oct. 1. (Feb. 2, p. 80.)

A contract will probably be let soon for the branch from Hanceville, Ala., in Blount County, to run six or seven miles to the mines of the Stoud Mountain Coal & Coke Co. Several bids have been received.

**METROPOLITAN WESTERN RAILROAD OF VIRGINIA.**—An amended act of incorporation was approved Jan. 22 for this company, with a capital stock of from \$1,000,000 to \$5,000,000, to build from a point on the Potomac in the county of Fairfax, Va., south to a point on the Potomac in Prince William County, with branches not to exceed 20 miles in length. The incorporators are: General W. W. Mackall, William S. Smoot, T. D. Moncure, Matthew J. Laughlin and D. S. Mackall of the State of Virginia; L. D. Whitaker and H. F. Lofland, of the State of Maryland.

**MISSOURI, KANSAS & TEXAS.**—The company, according to report, is contemplating an extension of about 15 miles northwest to Carbon Center, Mo., probably from the junction of the Eldorado branch at Walker.

**MUSCATINE, TIPTON & NORTHERN.**—The route of this proposed line is from Muscatine, Ia., northwest 97.8 miles via Moscow, Tipton, Walden, Stanwood, Olin, Anamosa, Painesburg, Coggon, Monti and Littlefield to Independence. The country is rolling prairie and very little heavy work will be required. Locating surveys are made, and it is proposed to let contracts for building soon. The line is to be completed not later than Jan. 1, 1901. There will be 400 ft. of steel bridging. (Feb. 2, p. 80.) The officers are given under Elections and Appointments. (Official.)

**NEW YORK, NEW HAVEN & HARTFORD.**—An officer writes that the extension of the New England across Fourth St. and Broadway in Boston is the connection of that road with the new terminal over the Old Colony road. There will be no changes in the bridges, except Broadway, which it is proposed to raise three or four feet to give more head room. (Jan. 12, p. 30.)

The tracks of the Valley Division in New Haven will have to be changed to allow the building of the new Connecticut River bridge. Two plans are proposed, one raising the road on a viaduct involving heavy damages to property; the other diverting the road south of the city to the New Haven's main stem, involving a rock tunnel 1,000 ft. long. The Valley Company originally paid \$1,000,000 for its entrance into the city.

**NORTHERN SUSQUEHANNA.**—This company was incorporated in Pennsylvania, Jan. 31, with a capital stock of \$160,000, to build a line from the mouth of Bailey Run, Potter County, south to connect with the Philadelphia & Erie at Saxon Mills. It is probably an incorporation of the Buffalo & Susquehanna. The directors are: Hon. H. E. Olmsted (President), Harrisburg; F. H. Goodyear, C. W. Goodyear, Buffalo, N. Y.; W. C. Park, Galetton; N. N. Metcalfe, W. H. Sullivan and Daniel Collins, Austin.

**OLD DOMINION & GRAND VALLEY.**—This proposed line is to run from a point in Virginia opposite Georgetown, Md., west about 20 miles to either Loudoun or Fairfax, Va.

**ONTARIO ROADS.**—Messrs. Perkins, Fraser & Burbridge of Ottawa are applying for a Dominion charter to build a line from Ottawa through Gloucester, Osgoode and Metcalfe to Morrisburg, Dundas County, with branches.

**OREGON MIDLAND.**—Surveys are in progress for this line from Klamath Falls, Ore., southwest about 60 miles to a point on the Klamath River near the State line. George T. Baldwin of Klamath Falls is an incorporator. (Nov. 17, 1899, p. 801.)

**OREGON RAILROAD & NAVIGATION.**—An officer writes that the company has no intention of building the line from Baker City, Ore., to Sumpster, as reported. (Feb. 2, p. 80.)

**PENNSYLVANIA COMPANY.**—With regard to the work on the Cleveland & Pittsburgh Division between Hudson and Bedford, Pa., an officer writes that the company is double tracking the line between Hudson and Wheelock, about 10 miles, and considerable of the work is completed. The line has been revised, some curves taken out and slight improvements made in the grades. (Jan. 19, p. 48.)

**PITTSBURGH & OHIO VALLEY.**—Under this title the American Steel & Wire Co. is to build a railroad about 15 miles long skirting Neville Island at Pittsburgh. The island is comparatively level and no heavy grading will be needed except at a few points. The intention is to have it completed for operation this summer.

The stockholders of the American Steel & Wire Co. are called to meet on Feb. 20 at Jersey City, N. J., to act on the question, among other things, of granting power to the company to engage in the business of building, buying, selling, leasing and operating railroads, wharves, piers, etc.

**PORT HURON & SOUTHERN.**—This company was incorporated in Michigan, Jan. 25, with a capital stock of \$50,000, to build a railroad from Port Huron south six miles to a point on the St. Clair River.

**PUERTO ROADS.**—Fox Bros. & Co. of New York have taken the contract to build about 36 miles of 3-ft. gage line in Puerto Rico, from San Juan southwest toward Mayaguez. It is to be financed by American capital. The Pennsylvania Steel Co. will supply the rails.

**QUEBEC & LAKE HURON.**—C. Langeller of Quebec is applying for a Dominion charter to build a line from Quebec to Lake Huron.

**QUEBEC ROADS.**—Messrs. Gonin & Brassard, Montreal, are applying for a Dominion charter to build a line from Gaspé southwest through the counties of Gaspé and Rimouski to connect with the Intercolonial near Causapsal.

**RED DEER VALLEY RAILWAY & COAL.**—Messrs. Laidlaw, Kappelle & Bicknell, of Toronto, Ont., are making application to build an extension of this line northeast to the Saskatchewan River.

**ST. LOUIS & NORTHERN ARKANSAS.**—J. B. Colt & Co. of Clinton, Mo., have taken the contract for rock work and grading on the extension of this line, formerly the Eureka Springs, from Eureka, Ark., east 45 miles to Harrison. (Dec. 15, 1899, p. 872.)

**ST. LOUIS & SAN FRANCISCO.**—Johnston Bros. of St. Elmo, Ill., have taken the contract for building the extension from Sapulpa, I. T., south about 175 miles to Sherman, Tex. It is said that sub-contracts are to be let. (Feb. 2, p. 80.)

**ST. LOUIS, KANSAS CITY & COLORADO.**—Contracts are let for the extension of this line west from Union, Mo. The intention is to build through Versailles, about 150 miles, and ultimately to Kansas City. L. M. Fouts of Weatherford, Tex., President of the Weatherford, Mineral Wells & Northwestern, has been made General Manager. The road is owned by ex-Governor D. R. Francis and associates of St. Louis, Mo. (Jan. 19, p. 48.)

**SALINE COUNTY BAUXITE & GRANITE.**—This company was incorporated in Arkansas Jan. 30, with a capital stock of \$35,000, to build a railroad 2½ miles long in Saline County. The incorporators are: J. Ernest Smith, R. S. Perry, Edmund S. Price, S. Redmond Smith, G. B. McKenzie, Fred. W. Bush, W. L. Cooper, Dewell Gonn and J. J. Beavers.

**SIoux CITY, BLACK HILLS & PACIFIC COAST.**—This company has been organized to build a railroad from Sioux City, Ia., west to Seattle, Wash. It is stated that the route to the Black Hills will be along the line of the old Sioux City & Northwestern surveyed in 1890 by John F. Duncombe, President of the Fort Dodge & Omaha. Westward from the Black Hills the route will be along the Big Horn River through a pass between the Shoshone and Wind River ranges of the Rockies, and thence northwest through Idaho and Washington. The offices of the company are at 407 Rookery Bldg., Chicago, and 507 Toy Bldg., Sioux City, Ia. Wm. Gordon of Sioux City is interested.

**TENNESSEE ROADS.**—The Dayton Coal & Iron Co., of Dayton, Tenn., writes that there is no foundation in the report that the company intends to build a line from Chattanooga, Tenn., south to a point near Lafayette, Ga. (Feb. 2, p. 80.)

**UNIONTOWN, WAYNESBURG & WEST VIRGINIA.**—The people of Green County, Pa., will take \$250,000 stock in this proposed line from Uniontown west via Waynesburg to Wheeling, W. Va. Wm. C. Jutte of Pittsburgh is an incorporator. (Jan. 12, p. 30.)

**UTAH ROADS.**—The City Council of Provo has granted a franchise to E. J. Ward & Sons to operate a steam belt railroad through the city.

**WASHINGTON & RICHMOND.**—A bill was introduced in the Virginia Senate, Jan. 26, by Mr. Flood to incorporate this company, with a capital stock of from \$50,000 to \$100,000, to build a railroad from some point on the Potomac River south to Richmond. The incorporators are: W. Brydon Tennant, J. J. Collier, Herman Ricketts, Walter Smith, John F. Wilkins, J. A. H. Junker, M. E. Sturges and G. F. Ambrose.

#### GENERAL RAILROAD NEWS.

**BALTIMORE & OHIO.**—A syndicate of bankers headed by Kuhn, Loeb & Co., and Speyer & Co., is reported to have bought \$8,600,000 4 per cent. bonds of the B. & O., and \$2,500,000 3 per cent. bonds of the Baltimore & Ohio Southwestern. It is understood that the proceeds are for internal improvements.

At the meeting of the stockholders held on Feb. 1, S. M. Provost, Third Vice-President and a director of the Pennsylvania RR., was elected a director of the B. & O., to succeed General Louis Fitzgerald, resigned. Mr. Provost will of course represent the interests of the Pennsylvania, now a large stockholder in the B. & O.

The foreclosure sale of the Newark, Somerset & Straitsville, controlled by the B. & O., is advertised for Feb. 19 at Newark, O., the upset price being \$300,000.

**BALTIMORE & OHIO SOUTHWESTERN.**—The Farmers' Loan & Trust Co. of New York, on Jan. 29 brought suit to foreclose a mortgage for \$175,000 against the Marietta, a subordinate line of the B. & O. S. W., which is also made a party defendant.

**BELLINGHAM BAY & BRITISH COLUMBIA.**—The company has placed a trust mortgage for \$1,000,000, of which \$600,000 is to take up a private mortgage, and the remaining \$400,000 for the proposed extension from Sumas, Wash., southeast 24 miles to Connells.

**CHICAGO & ALTON.**—Ten first mortgage bonds of the Mississippi River Bridge Co. have been called for payment April 1 at the office of the railroad company, 120 Broadway, New York.

**CHICAGO & NORTHWESTERN.**—Sinking fund bonds of 1879 to the amount of \$69,000 of 5 per cents., and \$67,000 of 6 per cents., have been drawn for redemption by the Farmers' Loan & Trust Co., trustees, at 105 and accrued interest due Feb. 1. (Jan. 5, p. 14.)

**CLEVELAND, LORAIN & WHEELING.**—The stockholders will meet on March 1 to authorize the issue of \$10,000,000 bonds. (Dec. 15, 1899, p. 872.)

**DES MOINES UNION.**—The Chicago, Burlington & Quincy has made a contract to use the terminals and depot of this company at Des Moines, Ia. Other tenants are the Chicago, Milwaukee & St. Paul, the Wabash and the Chicago Great Western.

The road comprises 17.7 miles of line in the city of Des Moines. (March 10, 1899, p. 182.)

**EVERETT & MONTE CRISTO.**—The Northern Pacific, according to report, has bought the western section of this line from Snohomish, Wash., to Everett, 11.5 miles, including the terminals at Everett.

**FITCHBURG.**—The directors of the Central Massachusetts have written to the Supreme Judiciary Court protesting against the acquiring of this road by the Boston & Maine on the ground that it would be a violation of their own lease. They have also filed a bill in equity against the measure.

**FORT WAYNE, TERRE HAUTE & SOUTHWESTERN.**—Foreclosure sale has been ordered of this line, controlled by the Chicago & Southeastern, on \$356,236 of bonds and interest. The bonds were guaranteed first by the Louisville, New Albany & Chicago (Chicago, Indianapolis & Louisville).

**HALIFAX & YARMOUTH.**—Through an act of Parliament of the Session of 1899, and a recent proclamation by the Governor-in-Council, the name of the Coast Railway of Nova Scotia has been changed to the above title.

**JACKSONVILLE & ST. JOHNS RIVER.**—Petitions by John E. Hartridge, Attorney for the Plant Investment Co., are before the U. S. Court at Jacksonville, Fla., with reference to the sale of this property, formerly the Jacksonville, Tampa & Key West. The petitioner is the holder of \$178,000 of first mortgage bonds and other properties of the company. Judge Locke entered an order directing the payment of 3 per cent. on the bonds, and that all balances from the proceeds of sales shall be paid pro rata on the bonds. The road is now a part of the Plant System. (July 5, 1899, p. 531.)

**KANSAS CITY, PITTSBURGH & GULF.**—The reorganization committee of which Wm. F. Harrity, Philadelphia, is chairman, gives notice that a payment of \$5 per share on the stock of the company under the plan of reorganization of June 14, 1899, is payable before Feb. 14 at the following places of deposit: Provident Life & Trust Co., Philadelphia; Seaboard National Bank and Mercantile Trust Co., New York; Guardian Trust Co., Chicago; Messrs. Kleinwort Sons & Co., London; Commerz-Disconto Bank, Berlin; Amsterdamsche Trustee Kantoor and Amsterdamsche Bank, Amsterdam. (Jan. 12, p. 30.)

Judge Thayer in the U. S. Circuit Court at St. Louis, Feb. 3, granted the State Trust Co. of New York a decree of foreclosure on the property of this company. It is stated that the action was taken to determine the amount of the debt, after which a sale will be effected. The date of sale is set for March 19.

**LITTLE MIAMI.**—The stockholders have agreed to a modification of the lease of this property to the Pittsburgh, Cincinnati, Chicago & St. Louis.

**MISSOURI, KANSAS & TEXAS.**—Judge Hook of the Federal Court at Fort Smith, Kan., has cited President Rouse of this road, and President Poor of the Kansas City & Pacific under charge of contempt for consolidating the two roads in violation of an injunction. (Dec. 29, 1898, p. 902.)

**NEW YORK, NEW HAVEN & HARTFORD.**—First mortgage 7 per cent. bonds to the amount of \$225,000, and 6 per cent. mortgage certificates of the Derby Division to the amount of \$480,000, both due on Feb. 1, have been paid. (Jan. 26, p. 64.)

**PEORIA, DECATUR & EVANSVILLE.**—F. J. Lisman & Co., 30 Broad St., New York, request holders of undeposited second mortgage 5's and of unassessed certificates to communicate with them to protect their interests. (Dec. 29, 1899, p. 902.)

This property was sold by public auction by Special Master in Chancery Brown at Mattoon, Ill., on Feb. 6, to the Central Trust Co., New York, representing the bondholders.

**PLANT SYSTEM.**—Stockholders of the West Pond, Walterboro & Branchville and the Walterboro & Western will vote on Feb. 12 to consolidate the corporations. Their lines run from Green Pond, S. C., to Ehrhardt, 39 miles, and are controlled by the Plant System.

**QUEBEC & LAKE ST. JOHN.**—H. M. Atchley, Secretary of the Bondholders' Committee, 4 Bank Bldgs., London, E. C., notifies the holders of the £780,000 5 per cent. first mortgage bonds that they may deposit their bonds with the Railway Share, Trust & Agency Co. of the same address at London, up to Feb. 22. The company defaulted on the bonds on July 1, 1899. (Aug. 4, 1899, p. 562.)

**RICHMOND, FREDERICKSBURG & POTOMAC.**—The stockholders on Jan. 31 adopted a resolution guaranteeing 12 per cent. to the State of Virginia on its common stock in that company so long as the State may hold it and not allow the road to be paralleled or taxed. This action is taken to meet the movement of the Seaboard Air Line in introducing a bill into the Virginia Legislature to incorporate the Washington & Richmond Air Line to parallel the line of the other company. (Railroad Construction column, Feb. 2, p. 80.)

**ST. LOUIS & SAN FRANCISCO.**—Proposals will be received until noon Feb. 10 at the U. S. Trust Co., New York, for the sale of 6 per cent. trust bonds of 1880 sufficient to exhaust the moneys to the credit of the sinking fund. (Aug. 11, 1899, p. 576.)

**TEXARKANA & FORT SMITH.**—An agreement has been reached between the Texas State officials and the Kansas City, Pittsburgh & Gulf, with reference to the proceedings against this property on the ground that the general offices have been removed from the State contrary to the law. The defendant pays a penalty of \$5,000 and the costs of the court, and will re-establish offices in the State within 60 days. (Aug. 18, 1899, p. 590.)

**WESTERN MARYLAND.**—The Commissioners of Finance of Baltimore on Jan. 31 decided to defer for this year the foreclosure of the mortgages held by the city until the city directors of the railroad company may have time to thoroughly investigate the affairs of the road. (Jan. 19, p. 48.)

**WESTERN NEW YORK & PENNSYLVANIA.**—New York press reports state that negotiations are practically completed to transfer the control of this property to interests chiefly represented by the Pennsylvania RR.